Canadian Public Health Journal

Devoted to the Practice of

PREVENTIVE MEDICINE

VOLUME XXV June, 1934 NUMBER 6

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Annual Meeting, Montreal, June 11th-13th

Published by the

CANADIAN PUBLIC HEALTH ASSOCIATION

Editorial and Business Offices:

105 BOND STREET, TORONTO 2

CANADIAN PUBLIC HEALTH JOURNAL

VOL. XXV June, 1934 No. 6

Some Public Health Activities and Needs in Ontario*

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IN a consideration of public health activities and needs in Ontario, no one can appreciate our present attainments and achievements, or even our needs, without a brief historical review.

By public health, we mean our present system of health protection in a community as distinguished from individual health. It might be called community health, and in the larger sphere, national health. Public health is based upon the sum total of individual health. Its origin was prompted on one of nature's first laws, that of self-preservation, and, in addition, man's inherent desire to promote his own protection and comfort. In attempting to achieve these ends, unconsciously or not, he at the same time gave preservation, protection and comfort to his neighbour and to the community.

Not much is known of the prevalence of communicable disease among the first inhabitants of this country, the Indians. There is nothing to indicate that they suffered from tuberculosis, but it is a well-recorded fact that the advent of the white man brought smallpox and tuberculosis, and that repeated epidemics of the former all but exterminated them, leaving only a remnant of the tribes that inhabited the eastern parts of Canada.

The struggle by New England and New France for control of the North American continent, and the constant contact between them and the Indians, helped to carry disease from one country to the other and kept it alive. The French settlers did not escape. Epidemics of smallpox and typhus occurred at startingly regular intervals; there was no quarantine, very little was known of preventive measures, and few precautions were taken to prevent the spread of infection.

Dr. J. J. Heagerty, in his excellent article, *The Development of Public Health in Canada*,[1] says:

> "In the year 1757, only two years before the conquest, Montcalm gave the number of smallpox sufferers in Quebec at from 2,500 to 2,600. At the time of the conquest, the French were able to call upon approximately 8,000 troops to defend the city. Had they had the same effective control

**Presidential address to the Ontario Health Officers' Association at its twentieth annual meeting, Toronto, May 28, 1934.*

[1]*Canad. Pub. Health J., 25: 53 (Feb.), 1934.*

> of communicable disease as exists to-day from the time they colonized the country, the natural increase in the population would have permitted them to place 50,000 men in the field, and Canada would still be a French country. It is therefore clear that disease has played a master hand in guiding the destiny of the country."

Plague was prevalent in France in 1720. In Marseilles, 30,000 people died in one year. Vessels were coming to Quebec from that city, and to prevent the importation of the plague, the Governor introduced quarantine regulations. This was in 1721 and was the first official quarantine action in Canada.

During the decades that followed, cholera, typhus, plague, smallpox and influenza were epidemic and the sufferers were, as far as possible, admitted to the wards of general hospitals. The result was that infection was communicated to patients and nurses and spread thence to the community with disastrous results. In the year 1847, 20,000 immigrants died of typhus, and a monument at Grosse Isle, while a memorial to the sturdy pioneers who were victims of the disease, also bears silent testimony to lack of proper health knowledge as we understand it to-day. As a health measure, the only concern of the people was the control of epidemics. There was no effort toward prevention, there was no department of health; control was effected through committees. When the epidemics subsided, the committees were disbanded. In the typhus year, 1847, seventy-five of these committees were formed throughout the country, and two years later a Central Board of Health was formed to deal with succeeding epidemics. The important thing to point out was that there was no continuity of action and nothing of a permanent nature in way of sanitary measures. The high mortality rate and the incidence of disease in these times, compared with that of the present, is the best justification of the existence of our present Provincial Department of Health.

In Ontario we had our first important health enactment in 1882, establishing a Provincial Board of Health; from that has grown our present system, and it is generally agreed that of all governmental departments, none is more important or has accomplished more for the individual or the state than has the Department of Health.

Modern medical science has made stupendous advancement in the past fifty years. While the thoughtful health official will not have the temerity to maintain that no subsequent five decades will equal those just passed, yet it cannot be denied that the past five decades have encompassed more advance than have any five centuries that preceded them. Many of the older conceptions of health and disease have been revolutionized. The public have been educated in matters of hygiene and a change has been brought about in their attitude toward public health, and they look to the state to assume responsibility in matters affecting their health. Ontario has taken on that responsibility and is daily discharging its obligation to the public in this regard as a brief comparative review of its record in some of the more important branches of health service will indicate.

In 1923 we had 1,665 cases of typhoid fever in Ontario with 238 deaths; in 1933 we had 451 cases with 44 deaths. This gratifying result has been brought about, no doubt, by our better methods of safeguarding our water supply, both in matter of treatment and prevention of contamination; pasteurization of

milk and better sanitation with respect to food supplies have also been important factors. Health officers should encourage pasteurization in their communities, and the Department might well consider the advisability of making it compulsory. It would also be an important factor in the control of undulant fever, of which there were 152 cases last year.

In 1923 we had 2,923 cases of diphtheria with 316 deaths; in 1933 we had 529 cases with 56 deaths. The marked drop has been brought about by the widespread use of toxoid. Nothing could better illustrate the efficacy of preventive measures, and any health officer who fails to advocate its use or to promote the holding of a toxoid clinic is remiss in his duty to his municipality and to his profession.

The incidence of smallpox shows a marked decline in the past decade. There is danger that the next ten years will not show as good results unless there is more general vaccination. There is a generation growing up in Ontario who are entirely unprotected in this regard and would fall easy prey should this disease, in a virulent form, become active. Health officers owe it to their community to advocate vaccination against smallpox: it is safe, it is harmless, and why subject ourselves to the criticism we would justly deserve should an epidemic occur?

Our results in these three diseases go far to prove to the intelligent observer the extent to which preventable diseases are preventable.

The tuberculosis death rate has been reduced in ten years by roughly thirty-six per cent. Better diagnostic methods and earlier diagnosis have been important factors, and of all the public health services, none have been of greater service, especially to the rural districts, than have the travelling chest clinics. They have been an aid to the general practitioner and to the community and have made the work of the health officer easier and better appreciated. The scope of their work should be broadened by more frequent visits. Hospitalization and institutional treatment have been extended; there are more beds available for treatment, but Eastern Ontario has urgent need for a sanatorium. Outside of Ottawa, we have no institution. Expenses of travel and distance from friends are valid objections on the part of patients and friends to institutional treatment in Weston or Muskoka. The future, however, is bright, and in two decades tuberculosis should be as rare as other communicable diseases that have been conquered.

Mental health is fast becoming an important health, social and economic problem. There continues to be a steady increase in the population of our mental institutions, and despite the discharges of those returned to normalcy or near normalcy, more institutions are needed if mental defectives are to be given proper care and treatment, and the community the deserved protection. The mental health clinics are doing important work, at least among children, in proper diagnosis and classification and recommendations for home treatment, but what does it avail if we lack institutional room for those who are incurable and unmanageable?

Sterilization has been offered as a remedy to stop the increase of unhappy defectives. From a purely medical point of view, it has strong arguments in its favour, but in any consideration of it due regard should be given to its economic and religious sides in conjunction with its social aspect. The state

may restrict the activities of the individual, but it is not the owner of his body. At all events, if sterilization is ever put into effect in this province, it should be as a right of the individual, not as a punishment. I do not believe it to be the remedy. It would lead to prostitution and increased venereal disease, which in the end might be a menace equal to or greater than mental deficiency. I suggest for consideration:

(1) Compulsory county registration of mental defectives and subnormal children.
(2) Special classes in schools for subnormal children.
(3) Greater and stricter segregation in institutions.
(4) Certificates of good health, mental and physical, as a prerequisite to marriage.
(5) Stricter marriage laws re consanguinity in marriage.

It is a well-known fact that the expectation of human life at birth has greatly increased during the past generation due to preventive medicine, improved sanitation, more intelligent management of infectious diseases, and better care of infants and children. On the other hand, it is equally true that the expectation of life for those who have attained forty years of age has not increased. One of the many reasons for this is the prevalence of cancer. It is the greatest of all public health problems; more than 10,000 people in Ontario to-day are sufferers from cancer.

Cancer clinics have been established and a sufficient supply of radium procured to meet the provincial needs for the time being. The duty of the medical health officer is to bring these facts to public notice by talks before service clubs, lay organizations, etcetera, and through the press, and educate the public that frequent examinations and early treatments are the essentials of success. The students of cancer throughout the civilized world agree that if we could apply the knowledge we have now for the prevention, diagnosis and treatment of cancer, we could quickly reduce cancer from second place among causes of death down to an insignificant position in mortality statistics.

The elimination of disease has done more to increase material prosperity than has any other one thing, but despite our scientific progress there are 180,000 persons in Canada constantly ill, and the direct cost of that illness is over $300,000,000.00 per year. One-third of this would be in Ontario. The question naturally arises: What is the cause, and what are we going to do about it? I think the causes are lack of education of the public in health matters and a universal failure to bring together medical knowledge and medical practice. Conditions must be so changed as to make the full benefits of curative and preventive medicine available to every individual. Sickness is a national social problem, the cost of which we pay directly or indirectly.

The most urgent problem in medicine to-day is not the accumulation of further knowledge, desirable as that undoubtedly is, but to bridge the gap which now exists between knowledge and practice. The general depression has laid its hand heavily on the medical practitioner and the part-time health officer. The doctor has always been a philanthropist, but to-day he is asked by the public to carry a disproportionate philanthropic load, as compared with other individuals in the community, and the public cannot continue indefin-

itely to rely on the devotion and self-sacrifice of any one class or profession to carry on essential service, very largely at its own expense, as has been the case with a substantial proportion of the practice of many doctors during the past three years.

With the exception of medical relief, which has been accepted only in some localities and does not include the great class between the indigent and well-to-do, no effort is made, under our present system, to overcome the economic barrier which now keeps patient and doctor apart. The problem which faces the public and the medical profession may be briefly stated to be provision of adequate medical care for all, with reasonable remuneration for those providing the medical care, by making it possible for all to contribute their share of the cost.

National health insurance is suggested as one means whereby this problem may be solved. The individual is no longer able to shoulder the responsibility, and it is plainly imperative it must be shifted from the individual to the group. Insurance in some form is essential if we are to be able in the future to keep both indigent patient and doctor alive. The sick man must have the doctor and the doctor must have something more than idealism and tradition on which to live. Health officers in particular are called upon to provide many services for which no provision is made for remuneration—for example, immunization—and we might well confer with the Ontario Medical Association to seek a basis on which salaries might be established. Any solution having the endorsation of this association and that of the Ontario Medical Association would carry much weight with municipal heads and the Bench if called on to adjudicate upon the matter.

The ignorance of the public is appalling with reference to matters of health. Medical health officers should continually keep before them, by means of talks, clinics and literature, etcetera, the services which the Department offers and which it renders, and at all times solicit the aid and co-operation of lay organizations and health agencies. Make your community health conscious. Stress child welfare: the welfare of the nation is vitally affected by the health of its children, and the promotion of the best physical and mental development of the children should be an essential part of the social health programme of any nation. I would suggest the holding of a Child's Health Day as a national day.

To sum up, I would say our most urgent health needs at present are child welfare, continued education of the public, and some form of health insurance.

Let us remember, that just as disease has played a master hand in the destiny of the country, so it will in our times, even with improved sanitation and preventive measures, and it behooves those in charge of public health to help maintain a high standard of physical fitness. Let us remember the words of Kipling:

"Nations have passed away and left no traces,
And history gives the naked cause of it.
One single, simple reason in all cases,
They fell because their people were not fit."

The 1932 Epidemic of Poliomyelitis in Quebec

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AS the preliminary report (1) of the 1932 epidemic of poliomyelitis in Quebec has been published, the news feature in this publication is lacking, but the delay in completion of this communication permits the presentation simultaneously of the epidemiological history of the epidemic and the later data on the degree of recovery of the patients.

In 1931 there were 1,078 cases of poliomyelitis in the province of Quebec, 730 of which occurred in the city of Montreal. In 1932 there were 784 cases in the whole province, 240 of which occurred in the city of Quebec, the centre of the epidemic. Though the total number of cases for the province was smaller in 1932 than in 1931, the incidence of the disease at the focal point was greater than at the focal point of 1931, as shown in Table I.

TABLE I

INCIDENCE OF POLIOMYELITIS IN THE WHOLE PROVINCE AND AT THE FOCAL POINTS DURING THE EPIDEMICS OF 1931 AND 1932

Locality	Population	No. of Cases	Rate per 100,000 Population
Province, 1931	2,877,255	1105	38.4
City of Montreal, 1931	818,577	730	89.2
Province, 1932	2,925,614	784	26.8
City of Quebec, 1932	141,000	240	170.2
District of Quebec, 1932	293,169	482	164.4

The epidemic of 1932 as a cause of death and of permanent disability assumed great significance in the city of Quebec and the immediate vicinity. Here the incidence of the disease was nearly as great as obtained in the 1916 epidemic in the city of New York (2) where morbidity rates of 234 per 100,000 were recorded in the Borough of Brooklyn, 306 in Queens, and 291 in the Borough of Richmond. The focus in our province thus suffered a severe blow.

Geographical Distribution of Cases

The incidence of the disease varied widely at different points. The focal point of the epidemic was, as stated, the city of Quebec and adjacent counties within the radius of 25 miles. In Tables II and III is shown the distribution of cases by counties and by municipalities. Some of the municipalities, it is seen, suffered very high attack rates; for instance, the village of Neuville 1226, Ancienne-Lorette 752, the town of Quebec West 573, the village of Saint-Charles-de-Bellechasse 253, the village of Saint-Michel-de-Bellechasse 246, and the city of Quebec 170 per 100,000 population. All these municipalities are within a radius of 20 miles of the city of Quebec.

TABLE II

INCIDENCE OF POLIOMYELITIS, 1932, IN THE COUNTIES OF THE DISTRICT OF QUEBEC

County	Population	No. of Cases	Rate per 100,000 Population
Bellechasse	22,025	69	313.3
Quebec	34,293	72	210.0
Lotbinière	23,154	39	168.4
Lévis	35,889	39	108.6
Montmorency	17,101	13	76.0
Portneuf	36,808	23	62.4
Montmagny	20,063	9	44.9
Drummond	26,779	11	41.0
Mégantic	35,678	11	30.8
Dorchester	28,115	8	28.5
L'Islet	19,559	4	20.4
Kamouraska	24,148	3	12.4
Arthabaska	27,390	3	11.0
Beauce	45,242	4	8.9
Nicolet	28,571	2	7.0
Char./Saguenay	45,411	3	6.6
Wolfe	16,784	1	6.0
Laviolette	30,454	0	....
Champlain	29,446	0	....
Frontenac	24,454	0	....
Yamaska	16,696	0	....
21 counties	588,080	314	53.4

TABLE III

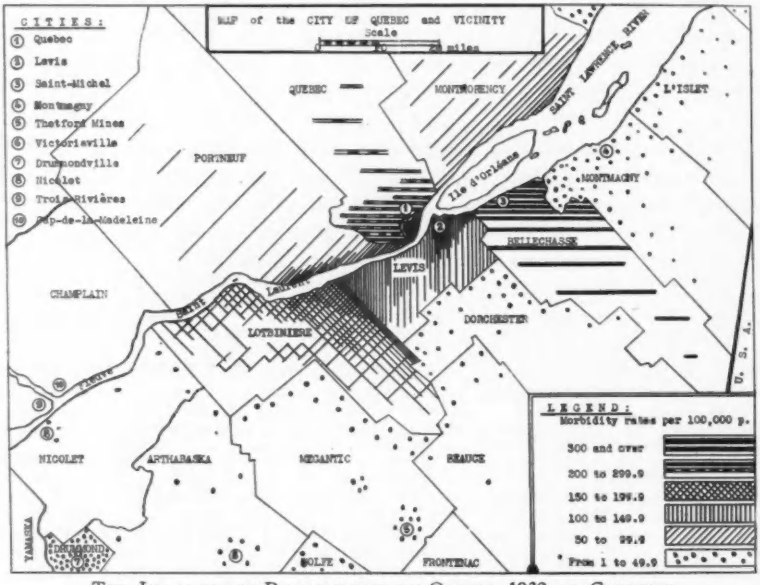
INCIDENCE OF POLIOMYELITIS, 1932, IN SOME MUNICIPALITIES OF THE PROVINCE

Municipality	Population	No. of Cases	Rate per 100,000 Population
Neuville Va	571	7	1225.9
Anc.-Lorette	3,058	23	752.1
Quebec West	1,744	10	573.3
St. Charles, Bell	673	17	252.6
St. Michel, Bell	1,424	35	245.8
Quebec City	141,000	240	170.2
Lévis	11,850	13	109.7
Lauzon	7,150	6	83.9
Drummondville	7,800	6	76.9
Montreal	838,500	71	8.5

The map on page 262 illustrating the incidence of the disease by counties at the centre of the epidemic enables one to visualize the territory attacked and to form an image of the severity of the disease. The county of Bellechasse is at the head of the list with a morbidity rate of 313 per 100,000 population and is followed by the county of Quebec—the city of Quebec not included—with 210; the rate in Lotbinière is 168, 109 in Lévis, 76 in Montmorency, 62 in Portneuf and 45 in Montmagny. In the counties located within a radius of twenty miles of the city of Quebec the morbidity rates are high; in those outside this limit the rates are lower and decrease with the distance.

It is worthy of notice that not one single case of poliomyelitis occurred on the Island of Orléans, during the year. The Island of Orléans, twenty-one miles long, with an average width of four miles, is in the Saint Lawrence River

near Quebec. The resident population is about 4,000, but the population is greatly increased in the summer time, the island being a summer resort of the city of Quebec. There is daily communication between the island and the shore through the numerous trips of the ferry-boat. The farmers come regularly to sell their products on the market of Quebec; the summer residents do their shopping in the city and tourists drive incessantly through and around the



THE INCIDENCE OF POLIOMYELITIS IN QUEBEC, 1932, BY COUNTIES

island. The population of the six municipalities is in constant and intimate contact with the population at large. However, no case of poliomyelitis occurred on the island. We had a few emergency calls, but in each case it was proved that we had not to deal with poliomyelitis.

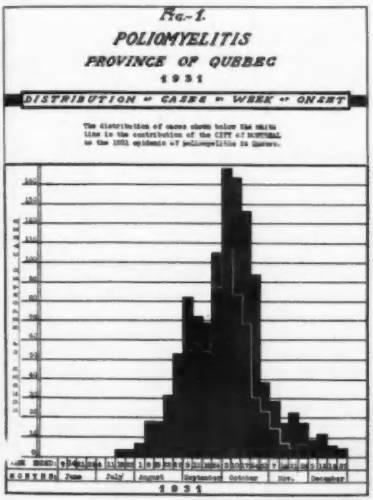
Date of Onset

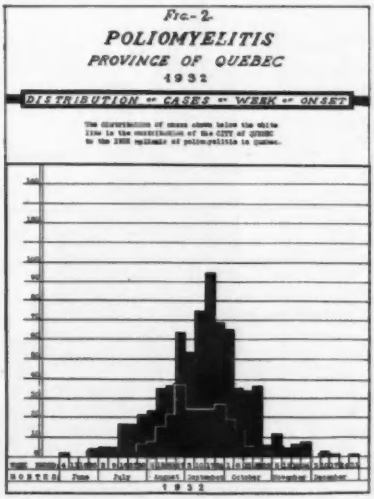
As the year 1932 was the second consecutive epidemic year in the province, and as each year one large city was the centre of the epidemic, data in regard to onset of each epidemic are presented in Figures I and II for comparison.

In 1931, sixty-eight per cent of the total cases in the province occurred in the city of Montreal, forming 28.4 per cent of the total population. In 1932, thirty-one per cent occurred in the city of Quebec, forming 4.8 per cent of the total population. In 1931 the epidemic originated in the city of Montreal in the third week of July and it was not until the first week of September that the first cases appeared outside of Montreal. The peak of the epidemic was in the first week of October and the largest number of reported cases in any one

week for both the province and the city of Montreal was also in the first week of October, with 148 cases in the province and 107 in Montreal.

In 1932, the epidemic began simultaneously in the province and in the city of Quebec during the last week of June, that is, three weeks earlier than in the preceding year. The largest number of reported cases in one week was in the last week of August for the city of Quebec and in the third week of September for the province, so that the peak week for the province was three weeks earlier than in 1931. This is the characteristic seasonal incidence of poliomyelitis epidemics which have been observed on this continent.





Sex and Age Distribution of Cases

The total number of cases occurring during the epidemic was 784. Between the notification of cases and our secondary investigation on the extent of recovery of the patients, we lost sight of 18 cases, reducing our final total thereby to 766. Doubtful cases have been eliminated from the study.

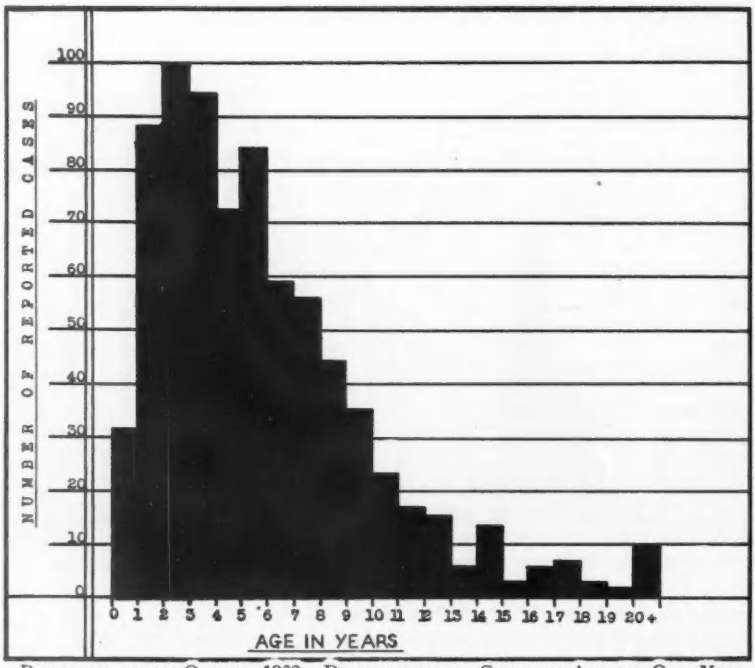
Of 766 patients, 433 were male and 333 female. This greater susceptibility of the males to poliomyelitis was shown by Lavender, Freeman and Frost (3) in their study of the New York epidemic of 1916. Our percentages are practically the same as those obtaining in the New York epidemic: 56.6 per cent of the cases in males and 43.4 in females. Up to the first week of October, the disease attacked males in a proportion of 64.4 per cent; in the latter part of the epidemic, females suffered in a larger proportion.

The mean age of the patients at the time of the attack was 5½ years. Out of the total, 385 children—or approximately 50 per cent—were under 5, and 663 or 86 per cent were under 10 years of age. The oldest patient was 28 years old and the youngest, an infant only 2 months old. The infant suffered from

the bulbar type and the adult from Landry's ascending type of paralysis and both died.

Figure III presents the distribution of cases by single years of age. This diagram shows a normal age distribution in poliomyelitis, the largest number of reported cases occurring in the third year of life, followed closely by the fourth and the second year. Only 13.6 per cent of all cases were found in persons over 10 years old.

FIG. III.



POLIOMYELITIS IN QUEBEC, 1932. DISTRIBUTION OF CASES BY AGE FOR ONE YEAR.

Another interesting feature is that the distribution shifts to older groups with the monthly progress of the epidemic, as shown in Table IV.

TABLE IV

PROPORTIONAL DISTRIBUTION, BY MONTHS, OF CASES 10 YEARS AND OVER

Month	Total No. of Cases	No. of Cases 10 Years and Over	Per cent of Cases 10 Years and Over
July	36	2	6.0
August	177	18	10.2
September	307	40	13.0
October	104	24	23.0
November	32	8	25.0

Spread in Population and in Families

The total number of cases applied to the 1932 population of the province

gives a rate of 26.8 per 100,000. The male population of the province, 20,000 greater than the female, suffered a morbidity rate of 29.5 per 100,000, as compared with a rate of 22.9 in the female population.

As shown in Table V, in the first two years of life the specific attack rate is 88.8 per 100,000 population. The morbidity is at the maximum rate from 2 to 4 years, with a rate of 118.2; it declines to 77.2 in the next age-group of 5-9 and to 15.4 in the age-group of 10-19 years of age. This age selectivity of the disease has been noted in various epidemics. In the 1931 epidemic the maximum incidence occurred about 2 years.

TABLE V

MORBIDITY FROM POLIOMYELITIS, 1932, IN DIFFERENT AGE-GROUPS

Age Groups	No. of Cases	Population of Group	Rate per 100,000 Population
0–1	119	134,000	88.8
2–4	266	224,973	118.2
5–9	278	360,143	77.2
10–19	95	618,000	15.4

Poliomyelitis does not appear to show many instances of multiple cases in families. In the New York epidemic of 1916 (2), 4.3 per cent of 8634 families attacked had more than one case. In the Quebec epidemic 13 per cent of 655 families had multiple cases. In each of three institutions, where one thousand children are living, there was a second case. Out of a total of 655 families attacked, 570, or approximately 87 per cent, had one case only; 65, or 10 per cent, had two cases; 13 families, or 2 per cent, had three cases; 5, or less than 1 per cent, had four; and 2 families, or 0.3 per cent, had five cases. It is rather uncommon to have five cases reported in the same family. In both families there were nine children and in each instance the diagnosis of poliomyelitis was corroborated. The attack rate in the familial population is 16.9 per 100 persons living in the homes attacked; in families where only one case occurred the rate is 14.4, compared with 30.0 per 100 persons in families where more than one case occurred. There were 7 cases in four institutions, with an attack rate of 0.4 per 100 persons, thus demonstrating again that agglomeration does not seem to be a determining factor in the occurrence of poliomyelitis.

Miscellaneous Data

Out of the 784 cases, 341 or 44 per cent went to hospitals for treatment at some period of their disease. Ample hospital facilities were provided. The Bureau of Public Charities was very broad in its interpretation of the law for these pitiful victims, and was of material assistance to a large number of families. The majority of our hospitals took pride in reducing the costs of hospitalization and we do not know of one single case which could not be treated in a hospital when it was advisable. In all the hospitals of the province the children received adequate medical care and it may be said that in many

instances they were the beneficiaries of very special attention from the nursing staff and the medical profession.

The medical profession was in a way a victim to its duty: eighteen children, daughters or sons of doctors, were attacked by poliomyelitis.

In 92 cases, the origin of the disease could be traced to a contact with a previous case; in 520 instances, or 88 per cent of the total number of cases, the origin was not found.

Three children suffering from paralysis of the respiratory centre were for weeks in the pulmotor machine until the centre regained normal activity.

Diphtheria Immunization and Poliomyelitis

We have been asked repeatedly and we did not see the reason of the question: "Is it possible that diphtheria immunization should protect against the disease (poliomyelitis) or decrease its virulence?" Recent research in immunology now indicates that the point was well taken, and deserves consideration. The question and my answer may not appear scientific, but every honest inquiry deserves a truthful answer. During the epidemic of 1932, the two counties having the highest morbidity rates from poliomyelitis were Bellechasse and Quebec counties, two counties in which no immunization had been done. The two counties having the next highest morbidity rates were Lévis and Lotbinière, in which over 85 per cent of the children had been immunized against diphtheria. These two groups of counties are located at an equivalent distance from the focus of the epidemic, i.e., the city of Quebec. The data for these two groups are brought together in Table VI.

TABLE VI

INCIDENCE OF POLIOMYELITIS IN TWO GROUPS OF COUNTIES, ACCORDING TO THEIR DIPHTHERIA IMMUNIZATION

Locality	Population	Cases	Rates 100,000 Population	Deaths	Rates 1,000 Population
Lévis-Lotbinière..... Immunization	59,043	78	132.1	7	11.9
Quebec-Bellechasse.. No immunization	56,318	141	250.4	26	46.2

The morbidity and mortality rates were much higher in the two counties in which no immunization had been done. The next four counties, placed according to their morbidity rates (see Table II), were also counties in which no immunization had been done; the following one, Mégantic, was largely immunized against diphtheria and had a lower morbidity rate from poliomyelitis than the others. The remaining counties had not a sufficient number of cases to allow the tabulation of significant rates. We have thus the following situation: Among four counties located within a twenty-mile limit of the city of Quebec, the rates were much higher in the two counties in which no immunization against diphtheria had been done; among the next five counties within the forty-mile limit of the city of Quebec, the lowest morbidity rates occurred

in the one county in which children had been immunized against diphtheria. The difference in the morbidity rates may be due to chance but it is not probable that chance would have selected the non-immunized counties in both groups for the higher rates; possibly a factor as yet undetermined favoured the immunized counties.

Let us now be more specific, and cite actual figures. In the two counties of Lévis and Lotbinière the total population is 59,043, of which 14,761 children are under 10 years of age and thus form a group susceptible of being attacked by diphtheria and poliomyelitis. Of course, persons over that age may acquire poliomyelitis and diphtheria, but, as a rule, we do not tend to immunize children over 10 years of age against diphtheria. Of these 14,761 children, 85 per cent had been immunized against diphtheria and 15 per cent had not. Should we want to know the value of immunization, we would compare the frequency of diphtheria in each particular group and get a specific answer for diphtheria; when the question of protection against poliomyelitis through diphtheria immunization is raised, a similar comparison between the two groups of children is rational.

Then, what is the frequency of cases of poliomyelitis in the two groups of children, immunized and not immunized against diphtheria?

Group	No. of Children in group	No. of cases of poliomyelitis	Attack rate per 1000 population in group
Immunized children	12,546	34	2.7
Non-immunized children	2,215	44	19.9

The attack rate of 19.9 per 1000 in the non-immunized group is over 7 times the rate of 2.7 occurring in the immunized group; or to put it in another way, the number of cases of poliomyelitis in the immunized group should have been increased by 635 per cent, from 34 to 250 cases, to obtain the same attack rates in both groups.

Let us now make a résumé of our findings:

1. In two groups of counties (Table VI), the counties where no immunization against diphtheria has been done showed a morbidity rate of 47.2 per cent higher and a mortality rate 74.2 per cent higher from poliomyelitis than the immunized counties.

2. In two zones of counties the disease showed higher morbidity rates in the non-immunized counties than in the immunized counties in each zone.

3. In a group of immunized counties, poliomyelitis again was selective for the non-immunized children living in the counties and showed very favourable morbidity rates for the children previously immunized against diphtheria.

This consistent selectivity of poliomyelitis for non-immunized groups of the population and the wide difference between the rates in the immunized and non-immunized groups suggest that at least one factor intervened and caused this deviation from the laws of probability. Is this factor the increased resistance of the juvenile population in the immunized counties through heterologous experience, i.e., toxoid immunization?

Experimental evidence, recently presented by Armstrong and Harrison(4), suggests that resistance to disease through inoculation of heterologous antigens may be of some value in modifying the course of subsequent infections or in preventing certain communicable diseases such as poliomyelitis.

The epidemiology of poliomyelitis is very complex; unknown factors of resistance in the patient, unknown virulence of the causative agent, characteristic age and sex distribution of cases, topographical and seasonal incidence, immunity of the population through previous epidemics and immunity of individuals through the abortive form of the disease, may be but a few of the factors which come into play in the course of an outbreak.

These unknown factors prevent us from drawing definite conclusions, but the least we may say is that our study on the incidence of poliomyelitis, in this particular outbreak, is favourable to the conclusions obtained by Armstrong and Harrison, though it does not prove them in any way.

Sites of Paralysis

The paralysis was selective in its location in that it was generally established in the upper parts of the limbs, the muscular groups of the fore-arm and of the leg usually being spared. There were only a few instances in which the hand and foot were the elective sites of paralysis. Thus it has not been deemed advisable to tabulate the sites of paralysis by muscular groups, but by main parts of the body. In Table VII the sites of paralysis in 695 cases occurring outside the city of Montreal are tabulated; in some instances, paralysis occurred in multiple sites.

TABLE VII

SITES OF PARALYSIS, BY AGE GROUPS

Sites of Paralysis	Age Groups											
	0–1		2–4		5–9		10–14		15–+		Total	
	C*	%	C	%	C	%	C	%	C	%	C	%
Head and thorax	8	7.1	17	6.7	18	6.6	1	1.4	2	6.1	46	6.2
Bulbar form	12	10.7	24	9.5	15	5.8	7	9.4	3	9.1	61	8.2
Four limbs	3	2.7	9	3.6	5	1.8	3	4.1	4	12.1	24	3.2
Paraplegia	18	16.1	42	16.6	28	10.2	11	14.9	5	15.2	104	14.1
Both arms	2	1.8	1	0.4	3	1.1	1	1.4	3	9.1	10	1.4
Crossed paralysis	1	0.9	0	0.0	4	1.5	1	1.4	0	0.0	6	0.8
Lower limb — Right	21	18.7	45	17.8	26	9.5	6	8.1	2	6.1	100	13.5
Lower limb — Left	10	8.9	26	10.3	26	9.5	6	8.1	2	6.1	70	9.5
Upper limb — Right	8	7.1	11	4.3	13	4.7	3	4.1	1	3.	36	4.9
Upper limb — Left	3	2.7	10	4.0	18	6.6	6	8.1	2	6.1	39	5.3
No paralysis	26	23.2	68	26.9	118	42.1	29	39.2	9	27.3	250	33.8
All locations	112	—	253	—	274	—	74	—	34	—	746	—

*"C": number of cases; and "%": per cent of cases in age-group.

One of the main features of Table VII is that in 250, or 34 per cent of the cases, the paralysis did not become definitely established and disappeared within a few hours or a few days of the beginning of the disease. Paraplegia occurred in 14 per cent and paralysis of the right lower limb in 13.5 per cent of cases;

paralysis of the left lower limb occurred in 9.5 per cent and the bulbar form was encountered in 8.2 per cent.

The number of paralyses of any site in proportion to all the paralysis showed no significant variation in any age-group. With increasing age, the right lower limb showed a slightly smaller percentage of the paralysis.

Degree of Recovery or Outcome of Cases

A justly deserved tribute has been paid above to the philanthropic and humane attitude of our hospitals. The medical profession at large proved competent to deal with the emergency created by this severe epidemic. As poliomyelitis had appeared in the epidemic form for the second consecutive year in the province, each physician worthy of the name had, the previous year, brought his knowledge up to date and was expecting new cases in 1932. The profession were thus familiar with the symptomatology of the disease and were able to form an early diagnosis.

The Provincial Bureau of Health had offered to the practioner the services of our medical officers in a consultant capacity; many availed themselves of this opportunity freely. The diagnostic ability of the profession was vindicated every day by the outcome of their own cases. The confidence the public placed in their family doctor, throughout this emergency, was certainly justified.

Moreover, all the cases were seen at least once, the majority twice or more often, by our medical officers. There can be no doubt, therefore, of the reliability of the diagnosis on the cases forming the basis of this report. They were acute anterior poliomyelitis. As all doubtful cases were eliminated from this study, the facts and figures herein presented are the discriminative results based on selective and rational treatment of the material.

THE USE OF CONVALESCENT SERUM

In a previous publication (1), the methods of preparation and administration of the convalescent serum have been explained in detail. The serum was given free of charge to any physician reporting a case to the Provincial Bureau of Health and though, for a few days, our supply was low, we were always able to meet the demand. We do not know of one single case when the child could benefit by the serum where he was denied it. In one instance only, to our knowledge, did the parents refuse their permission to have the serum administered. With the exception of cases where the paralysis was definitely established, each child received at least one dose of immune serum during the preparalytic stage or during the development of paralysis. One patient presented symptoms of serum sickness; a little boy, three years old, who, on developing a paraplegia, received a dose of 25 cc. of serum and ten days later presented a rash. This disappeared quite rapidly and, incidentally, the child recovered perfectly from his paralysis.

In the last few years, many and diverse opinions have been brought forward on the value of human "convalescent" serum in the treatment of poliomye-

litis. We could not let this epidemic pass without trying to accumulate complete data and our conclusions are made on the following basis:

1. Every case considered in this study was really a case of poliomyelitis.
2. Each case occurred during an epidemic year and all the cases which have their date of onset within the year are included. We, thus, have not to deal only with the variability of sporadic cases, though we could not ignore them.
3. The study covers the whole territory of the epidemic and not only one city or one county or one district.
4. Convalescent serum was offered without discrimination between cases: it was administered either during the preparalytic stage or during the period of development of paralysis, and it was not administered when paralysis was definitely established beyond dispute. That is, in many instances serum was administered after recognized signs of paralysis appeared but further progression of paralysis was feared.
5. With each bottle of serum was included a questionnaire, to be filled by the practitioner, bearing on the semeiology of the case, the period at which the serum was administered and the actual location of paralysis.
6. The information received from the physician was duplicated and controlled by our medical officers who made a special and complete investigation of each case.
7. Six months after the end of the epidemic, our officers called once more on each patient still living, and examined him or her carefully, making a special report on the degree of recovery of function.
8. The severest cases were, of course, hospitalized; the records of the institutions were at our disposal and we profited from the opportunity of seeing these patients quite regularly.
9. The certificates of deaths were critically analyzed, with the co-operation of the physician and of the statistician of the Provincial Bureau of Health.
10. Finally, the number of cases is large enough to obtain results of significant value.
11. As recovery of function may progress for 18 months after the onset of poliomyelitis, later data, as here presented, are the more valuable.

The conclusions of this report are therefore based on critical analysis of sound observations and as such are worthy of serious consideration.

We will consider now, in Table VIII, the outcome of cases by age-groups, without consideration of the merits of serum therapy.

As the serum was administered similarly to the patients of all age-groups, differences that might be observed in the recovery of different age-groups cannot be attributed to this therapy.

Complete recovery occurred in a larger percentage in the age-groups 2-4, and especially 5-9 and 10-14; on the other hand, the age-groups 0-1 and 15 and over have a proportionately larger partial recovery; again, the latter age-

groups showed a higher percentage of patients with no recovery. The lower case fatality rates were in age-groups 0-1 and 5-9, the higher in 2-4 and 15 and over. Out of the total number of patients, 61.6 per cent showed complete recovery, 19.8 a partial one, and in 4.8 per cent the original paralysis persisted, while 13.7 per cent died.

TABLE VIII

RECOVERY OF FUNCTION AND MORTALITY
(By Age-groups)

Age Groups	No. of Cases	Degree of Recovery of Function							
		Complete		Partial		None		Deaths	
		Cases	%	Cases	%	Cases	%	Cases	%
0– 1	104	51	49.0	25	24.0	9	8.7	19	8.3
2– 4	237	136	57.4	51	21.5	10	4.2	40	16.9
5– 9	257	177	68.9	48	18.7	9	3.5	23	8.9
10–14	69	45	65.2	13	18.8	2	2.9	9	13.0
15–+	28	12	42.9	8	28.6	3	10.7	5	17.9
City of Montreal	71	51	71.8	7	9.9	4	5.6	9	12.7
All ages	766	472	61.6	152	19.8	37	4.8	105	13.7

The social cost of the epidemic to the province was the loss of 105 lives and the burden of 37 crippled children. Out of the 152 patients who have made a partial recovery which may progress still further, fifty per cent may hope to lead their regular life in the future and the remainder will be self-supporting.

Value of Serum Therapy

What has been the value of human "convalescent" serum in the early treatment of poliomyelitis? In Table IX we present figures obtained through our investigation in the province during 1932. The 71 cases of the city of Montreal are not included, though the results in them were in agreement with those outside the city; the data collected by the officers of the Department of Health of the city had been gathered in a different manner and could not be treated by the same statistical method applied to our material.

TABLE IX

RECOVERY IN POLIOMYELITIS ACCORDING TO USE OF SERUM

Use of Serum	No. of Cases	Degree of Recovery							
		Complete		Partial		None		Deaths	
		Cases	%	Cases	%	Cases	%	Cases	%
Before paralysis	339	298	87.9	14	4.1	3	0.8	24	7.1
After paralysis	220	73	33.2	84	38.2	19	8.6	44	20.0
None given	136	50	36.8	45	33.1	13	9.6	28	20.6

Out of 695 cases, 339 or 49 per cent of the patients received the serum before paralysis, 220 or 32 per cent when progression of paralysis was feared,

and 136 or 19 per cent were not given serum because the paralytic lesions already had become established when the physician was first called. Among this last group of 136 the outcome was as follows: 37 per cent made a complete recovery, 33 per cent a partial recovery, 10 per cent showed no improvement and 20 per cent died from poliomyelitis. The group of children, 220, receiving serum after the onset of paralysis, showed a striking similarity to those not given serum: 33 per cent recovered completely, 38 per cent showed partial recovery, in 9 per cent there was no evidence of recovery, and 20 per cent died. The group of children who received the serum before paralysis showed an altogether different recovery picture: 88 per cent had a complete recovery, 4 per cent a partial recovery; in three cases, or less than 1 per cent, the paralysis persisted, and 7 per cent died.

As there was no difference between the group that did not get serum and the group that were given serum after the onset of paralysis, they will now be considered as one group only, to be studied in relation to the group in which serum was given before paralysis.

Before comparing these groups it is necessary to state that there was little difference in the age distribution, the age-group of 5-9 having a slightly higher percentage among those who were not given serum in the preparalytic stage. Differences in age distribution of cases, therefore, had no significant effect on our results.

In the first group, those who were not given serum or given it after the onset of paralysis, there were 356 children, of which number 35 per cent made a complete recovery and 36 per cent a partial recovery; 9 per cent showed no evidence of recovery of function and 20 per cent died. In the other group were 339 patients who received convalescent serum in the preparalytic stage. The outcome in these was as follows: 88 per cent recovered completely, 4 per cent recovered partially, 1 per cent showed no evidence of recovery, and 7 per cent died.

The value of the serum treatment may be better illustrated by applying the recovery rates obtaining in the group to whom serum was successfully administered to the other group of patients. The actual recovery is given in parenthesis. If serum had been promptly administered to children who did not receive it before paralysis, the outcome of cases would be materially different: 313 (123) children would have made a complete recovery, 15 (129) a partial recovery, 3 (32) would have been totally disabled and 25 (72) would have died from their attack of poliomyelitis.

We are thus justified by our experience in concluding that the use of human convalescent serum proved of marked value in the early treatment of poliomyelitis during our epidemic of 1932.

Mortality

In previous epidemics the case fatality rate has varied from 5 to 30 per cent; the 1932 outbreak in the province of Quebec gave 105 deaths out of 766 cases or a rate of 13.7 per hundred cases. In the city of Montreal, 9 children

out of 71 patients died, or a rate of 12.5 per cent; in the city of Quebec, the focus of the epidemic, poliomyelitis caused 240 cases and 32 deaths, or again a case fatality rate of 13.3 per cent. The mortality was higher in males than in females, with a rate of 15.2 compared with 11.7 per hundred cases.

The case fatality rates were higher in the older and in the younger age-groups, e.g., 0-1, 16.0; 2-4, 16.9; 5-9, 9.2; 10-14, 13.9; and 15 years and over, 16.7 per hundred cases occurring within these particular age limits.

The death usually occurred during the first days following the onset of the disease. This has been especially ascertained from the medical death certificates, and our tabulations in this connection are presented in Table X.

TABLE X

EARLY OCCURRENCE OF DEATH, IN POLIOMYELITIS

Measure of Elapsed Time (indicated by sub-headings of table)	Elapsed time from the date of onset of the disease to the death of patient by					
	One-month periods		Five-day periods within the first month		One-day period for the first ten days of disease	
	No. of Deaths	Per cent	No. of Deaths	Per cent	No. of Deaths	Per cent
1	92	87.6	67	72.8	6	6.1
2	7	6.7	15	16.3	17	20.7
3	2	1.9	4	4.3	15	18.3
4	2	1.9	5	5.4	18	22.0
5	1	1.0	1	1.1	12	14.6
5	1	1.0	0	0.0	7	8.5
7					3	3.7
8					2	2.4
9					2	2.4
10					1	1.2
Total.....	105	100.0	92	100.0	82	100.0

Of the total of 105 deaths, 67 or 64 per cent occurred within the first 5 days, 15 or 14 per cent during the next 5 days, making 82 or 78 per cent within the first 10 days; 92 or 88 per cent occurred within the first month, 7 in the second month, 2 in the third, 2 in the fourth, and 1 in each of the fifth and sixth months. All these later deaths were directly attributable to poliomyelitis. It is evident, therefore, that the greatest liability to death in poliomyelitis cases is in the first few days following the onset of the disease.

SUMMARY

1. The prevalence of poliomyelitis, in the epidemic form, was higher in the attacked region in 1932 than in 1931.

2. The focus of the epidemic was the district of Quebec.

3. The epidemic began during the last week of June and the largest number of reported cases in one week was in the last week of August for the city of Quebec and in the third week of September for the province.

4. The males suffered more than the females, especially in the first part of the epidemic. The mean age of the patients was 5.5 years; fifty per cent of the children were under 5 and 86 per cent were under 10 years of age. The largest number of reported cases occurred in the third year of life. The age selectivity of the disease occurred within the age limit of 2 to 4.

5. Multiple cases occurred in 13 per cent of families attacked.

6. Poliomyelitis appears to have been less severe in counties where a large proportion of the children were immunized against diphtheria.

7. The sites of election of paralysis were the upper part of the limbs.

8. The use of human "convalescent" serum proved of marked value in the early treatment of cases of poliomyelitis.

9. The case fatality rate was 13.7 for the province as a whole.

10. The lethality during the first days following the attack from poliomyelitis is notable.

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REPORTED CASES OF CERTAIN COMMUNICABLE DISEASES IN CANADA* BY PROVINCES

FEBRUARY, 1934

Diseases	P.E.I.	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Diphtheria	—	20	3	60	35	29	16	2	4
Scarlet Fever	2	23	9	285	539	95	32	49	414
Measles	—	1	6	385	77	494	1459	6	5
Whooping Cough	—	44	—	821	393	100	113	26	61
German Measles	—	7	—	17	17	20	2	1	11
Mumps	—	—	—	571	474	17	14	—	312
Smallpox	—	—	—	—	—	—	1	—	4
Cerebrospinal Meningitis	—	—	—	2	3	1	—	—	2
Anterior Poliomyelitis	—	1	—	3	1	—	—	—	1
Typhoid Fever	—	—	5	109	15	—	3	—	—
Trachoma	—	—	—	—	—	—	1	—	13

*Data furnished by the Dominion Bureau of Statistics, Ottawa.

Making Ice Cream Safe*

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THE ever increasing popularity of ice cream, and the fact that it undoubtedly ranks next to milk among dairy products as a cause of epidemics, have required the health officer to take the necessary means to ensure the manufacture of a safe product.

Standards have been established for many years in the United States and Canada, but most of these deal with the quantitative proportions of the different components of ice cream. Very few of them refer to plant sanitation, minimum bacterial content, or methods of processing. These standards have proved to be necessary to prevent the sale of falsified or misbranded products, but they are now incomplete on account of the many improvements made in the preparation of ice cream during the past few years.

Ice cream firms have established their reputation on the palatability of their respective products and very few would dare to place on the market a low grade product. Nevertheless, very palatable ice creams may have been processed in a very insanitary way, and many of them have been found to be dangerous. From 1909 to 1927 the United States Public Health Service has reported thirty-two epidemics believed to be caused by ice cream. Of these, four were caused by pasteurized ice cream.

The fact that ice cream may be dangerous is accepted, and efforts must be made to eliminate the principal causes of contamination if any improvement in the bacterial content of this product is to be achieved.

Since most ice creams are pasteurized, it is well to consider the contamination which may occur (1) before pasteurization and (2) after pasteurization.

Sources of Contamination of the Mix before Pasteurization

The sources of the bacteria before pasteurization are the ingredients and the equipment.

Ingredients such as cream, milk, condensed milk, skimmed milk, gelatin, etcetera, must be of good quality and of low bacterial content. If the mix is not to be pasteurized, greater care should be exercised in the choice of the milk products, because they will be the chief sources

**Presented at the annual meeting of the Public Health Engineering Section, Canadian Public Health Association, Toronto, May, 1933 (joint session with the Ontario Health Officers' Association.*

of bacteria found in the final product. Gelatin should be melted in a water-bath at 175° F. and kept at this temperature for at least 10 minutes, in order to destroy most of the bacteria present, before being added to the mix. This procedure should be encouraged even if the mix is to be pasteurized.

The equipment which is used in the process before pasteurization of the mix, such as cans, weigh vats, pipes, mixing vats, pasteurizers, etcetera, should receive the same scrupulous treatment of washing and sterilizing as the apparatus used after the mix has been pasteurized.

Pasteurization

In order to ensure efficient pasteurization, the pasteurizer should be equipped with a flush valve of approved design, and indicating and recording thermometers.

Though pasteurization at 145° F. for 30 minutes is commonly used by ice cream makers and often gives good results, it is generally accepted that a temperature of 150° F. for 30 minutes should be required for the pasteurization of such a viscous product. More recently, the temperature of 170° F. for 30 minutes has been tried without materially affecting the flavor, texture or body of the finished product. The fact that this high temperature can be used for the pasteurization of an ice cream mix is of great sanitary significance. The higher temperature will greatly reduce the bacterial content of the final product and there will be very little probability that pathogenic bacteria will survive.

SOURCES OF CONTAMINATION OF THE MIX AFTER PASTEURIZATION

The sources of contaminating bacteria after pasteurization are to be found in the materials, the equipment and the personnel.

The ingredients which enter the mix after pasteurization are nuts, fruits, colors and flavoring materials. Nuts and fruits should always be good, fresh and clean. Colors, usually considered to be practically sterile, have been found, in certain instances, to be a possible source of contamination. This is particularly true of liquid colors which are diluted with water and used as stock solutions for some months. Containers should be thoroughly washed and sterilized before the stock solution is made. The water which is used to dilute the colors should be boiled.

The equipment through which the pasteurized mix must pass before it reaches the final containers is varied and of complicated construction. The mix is usually sent to the homogenizer and the cooler, and then to the aging vat, by way of a series of pipes and troughs. The cooler and especially the homogenizer are pieces of machinery which are very difficult to wash and sterilize. Proper care must be taken if good results are to be expected.

Aging Process

If, through carelessness, any of the apparatus mentioned above are a source of contamination, the bacteria which are picked up in passing through this equipment will have an opportunity of multiplying during the aging period. For this reason the aging temperature should not greatly exceed 40° F.

The aging period may not be longer than two to four hours, since it has been shown by several workers that the longer period is unnecessary to produce the desired overrun and that the product is equal in every respect to that aged twenty-four hours or longer. This decrease in time will naturally lower the bacterial content of ice cream.

The aging vat should be equipped with a flush valve in order that every portion of the mix may be maintained at the same low temperature. It should also be equipped with a recording thermometer. The records of the latter and those of the pasteurizer should be dated and kept on file for at least six months in order to permit a check of the operation in case of an epidemic.

After being aged, the mix is directed to the hoppers and freezers and then to the filling machine, where it is put into the final containers. The freezers, particularly, are usually very difficult to wash and sterilize.

Recommendations regarding Washing and Sterilizing of Equipment

After the day's run, every piece of equipment should be rinsed with lukewarm water to remove the greater part of the product which adheres to the surfaces. Then the sanitary piping should be disconnected and all machinery taken apart. Each piece should be washed and brushed in a hot water solution containing two pounds of cleaner per 100 gallons of water. After being washed, it should be rinsed with clear warm water, sterilized with live steam and let stand to dry overnight. The next day, before operations are started the entire equipment should be sterilized again by circulating through it a chlorine solution of 100 p.p.m. The homogenizer requires special attention. After the day's operation, it should be rinsed with lukewarm water for a few minutes and taken apart. Each piece should be washed and brushed with a cleansing solution and rinsed with hot running water. The machine should again be put together and sterilized by running water at 180°F. for about ten to fifteen minutes under a pressure of about 500 pounds.

Contamination by Personnel

The great improvements which have been made in the equipment for ice cream manufacture have undoubtedly effected some reduction in the chances of direct contamination by the persons handling the product, but, on the other hand, they have complicated the construction of the machines and have thus increased the difficulty of washing and sterilizing them properly.

The personnel handling the product still constitutes a dangerous possibility of contamination and great care must be taken in the selection of these employees. They should be submitted, every year, to the usual medical examination of food handlers. Further, while at work they should wear clean garments and keep their hands scrupulously clean.

DISCUSSION

It is well known that disease-producing bacteria can resist very low temperatures. Therefore the holding of ice cream at a very low temperature for a certain time in the hardening room cannot be relied upon appreciably to reduce the danger of an infected product.

Lately a method has been tried at the Washington Agricultural Experiment Station to obtain viable Lactobacillus acidophilus in a sherbet mixture containing 70 per cent of milk. It was found that during the freezing process the reduction in viable L. acidophilus was insignificant, and that after seven days of storage at −17° C. the majority of the samples tested showed the presence of viable L. acidophilus in numbers ranging from 100 millions to 1600 millions per cc. L. acidophilus is an organism which normally lives at body temperature and therefore is comparable to many disease germs.

The object of sanitation in ice cream manufacture is to prevent the contamination of the raw products by proper production control and proper handling, and also to eliminate any possible source of contamination after the mix has been pasteurized.

In milk pasteurization plants we endeavor so to order the operation and to arrange the equipment as to limit the excursion of the milk from the pasteurizer to the bottler. The same policy, I believe, should be followed with ice cream, and the number of operations subsequent to pasteurization should be reduced to a minimum.

Since the possibilities of contamination after pasteurization are many, particular effort should be directed towards improvement of the methods of processing after the mix has been pasteurized. Certain operations must necessarily be done subsequent to pasteurization, but all other operations should precede pasteurization so as to minimize the possibility of the recontamination of this dairy product.

Research should be conducted to determine the possibility of homogenizing the mix before pasteurization. Such an alteration in the usual practice would exclude, after pasteurization, the use of a machine which is very difficult to wash and sterilize properly. The addition of colors and flavors before pasteurization would also diminish, to a certain extent, the danger from contamination from these sources.

In the meantime, bacteriological standards, together with official plant control supplemented by conscientious plant operation, will do much to ensure the production of a safe ice cream.

Trachoma among the Indians of Western Canada

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FROM the economic, humanitarian and public health points of view, the trachoma situation among the Indians of Western Canada constitutes a serious problem. The total economic loss resulting from the ravages of the disease would be difficult to estimate as economically many of the Indians of Western Canada are passing through a transitional period. At any rate, unless more effort be expended to check the disease, undoubtedly the time is not far distant when contributions will have to be forthcoming from the public treasury to aid those individuals whose ultimate disability precludes any possibility of self-support.

Many of those afflicted suffer intensely due to the inflammation of the eyelids and the accompanying iritis. The latter condition is present especially during the summer months, when the intense heat, fine alkali dust and sand storms aggravate the discomfort. The constant spasm of the orbicularis muscle, the photophobia, the lachrymation and congestion of the ocular vessels, convey to the observer some idea of the pain and discomfort being suffered.

Distribution of Cases

Cases of trachoma among the Indians are distributed from Ontario westward through the Prairie Provinces and into British Columbia. Ontario has the lowest incidence; the greatest occurs in the central and southern parts of the prairies and in eastern and central British Columbia. In these latter areas at least 70 per cent of the cases of markedly impaired vision or incurable blindness are due to this malady. In certain settlements the incidence of infected persons may reach 40 to 50 per cent of the population. The northern parts of Alberta, Manitoba and the Pacific coastal region are least affected and the cases are of a much less severe character than those encountered in the so-called "trachoma belts".

Many cases of trachoma can be found among the immigrants of eastern and south-eastern European extraction. Similarly, cases have been noted among the Chinese of British Columbia, and many people of mixed Indian and white blood are also afflicted. In the whites cases have been observed which undoubtedly had their origin in the native population, and as time goes on and more residents of the reserves seek employment among the whites, this danger will be correspondingly increased.

Popular Conception of Trachoma, among the Indians

The popular conception of trachoma, among the Indians, is not that of a communicable disease. Many believe that the process of losing their sight is concomitant with greying hair and other manifestations of age. Those who have been blinded more abruptly, by a perforating ulcer, claim the disaster to be due to entrance of a foreign body into the eye a short time previously. Others, with a badly damaged cornea due to pannus and opacities, explain their condition as the direct result of being bewitched by an enemy or a conjurer.

Origin of the Disease

Many of the more intelligent and older members of the Stoney and Cree nations believe that this disease was introduced into Canada by infected Indians from the United States who accompanied early traders into the southern parts of the Prairie Provinces and British Columbia. The possibility of the Indians contracting the disease from the earlier white settlers is quite unlikely, as many of the latter did not arrive in the country until after 1890. Moreover, it is hardly conceivable that the disease could become so generalized in such a short time. Many of the older infected Indians claim the disorder to have been present in their families long before the advent of the European settler.

Should it be true that the American Indians originated in a group of nomad races from the plains of Mongolia, then, considering the incidence of trachoma among the Mongols, it is quite possible that the Indians have had the disease from time immemorial. The presence of the disease in large numbers of people in the hinterlands of British Columbia could well be accounted for on these premises, as could the rather common fatalistic attitude which is encountered among them. Indeed, at present the best evidence would indicate that trachoma has been present among these people for generations.

Etiology and Predisposing Factors

It has occasionally been suggested that trachoma is caused solely by nutritional disturbances and unbalanced diet. This is an entirely unwarranted assumption. Of course, all other factors being equal, a patient with a scrofulous diathesis or suffering from malnutrition tends to run a more malignant or refractory course. In such cases phlyctenular conjunctivitis is not infrequently an accompanying disorder. The representation of malnutrition and avitaminosis as the sole causative factor in trachoma, however, must be rejected as a most dangerous theory. Indeed, the actual causative agent of trachoma has not yet been established, although great credit is due to Lindner, Prowazek and Noguchi for their efforts in this field.

Climate and local factors have an important bearing on the incidence and severity of cases. Areas of high altitudes, with finely pulverized alkaline soil, frequent dust and sand storms, intensive heat and dryness, have the highest incidence and the most extreme cases. Settlements in which these conditions prevail, where housing conditions are poor and overcrowding exists, where there is a lack of individual and personal hygiene, invariably show the highest percentage of blindness. The fine sand and dust blown into the eyes of trachoma patients aggravates the existing conjunctivitis, which is further increased by rubbing with the hands. Fine abrasions, due to these scarifying bodies, are found on the cornea and the superimposed irritation leads to a more rapid growth of the trachomatous pannus downward toward the cornea. The possibility of corneal ulcers increases, as does also the danger of either perforation of the globe or subsequent formation of thick corneal opacities which in many cases are apt to cover the pupillary area. On the other hand, districts such as Northern Manitoba or Alberta, and the coastal region of British Columbia, where there is more abundant rainfall and much green foliage, appear to have a much lower incidence.

Mode of Transmission and Spread

Whatever the exact etiological agent may be, the importance of the eye discharge in spreading the disease must be emphasized. The menace of an individual to a community is in direct proportion to the amount of lachrymal secretion. A trachoma patient with complicating corneal ulcer and profuse discharge is especially dangerous as an agent of dissemination.

It is readily seen, therefore, that the great channel of transmission is the family. Examination of children coming from various districts in the residential school area invariably indicates the families and areas in which one can be certain to encounter the disorder to the greatest degree. In such areas the mental lethargy or stupid stoicism in the attitude of the patients is apparent.

Many cases of trachoma in children are doubtless attributable to aged grandmothers who occupy the same dwellings. Their usual headdress is a large silk kerchief worn over the head in a manner similar to that seen among the peasants of Eastern Europe. This scarf is tied under the chin with a large knot, the loose ends of which hang downwards and are used to wipe off the continuous secretion from the diseased eyes. They serve another purpose, namely, to wipe the noses and cheeks of the children of whom the grandmothers are so fond. It is not surprising, therefore, that many cases of trachoma are to be observed among the young children.

The general lack of even the most elementary hygiene in many of the Indian houses plays an important part in the spread of trachoma. A common towel and wash basin are a frequent sight. It is not surprising, therefore, that, in a household harbouring an advanced case with profuse secretion, it is not uncommon to find most of the other members afflicted with the disorder, in varying stages.

The possibility of the Indian introducing the disease into the white population must not be overlooked. The Indian population is increasing and overpopulation is even now forcing individuals in some areas to secure a supplementary living from labour in the surrounding territory. Some are engaged in temporary employment with nearby farmers; others in fishing, canning, hop-picking, and cattle round-up. Some of the girls obtain employment as domestics; others marry whites and leave the reserve. The danger of cases spreading the disease among workmen with whom they associate is very apparent. This is especially true in bunk-houses, where common towel, wash basin and soap constitute an ever-present menace as agents of dissemination.

Clinical Features

Clinically, trachoma does not run a steadily progressive and destructive course. Periods of exacerbation are interpolated between those of dormancy or sub-chronicity. Some cases become quiescent without any treatment whatever. Such cases are classified as arrested; but whether or not they will light up again, only time will tell.

Certain individuals in trachoma families appear to have an inherent immunity to the disorder. There is little reason to assume that they have not been repeatedly infected, however, as no undue precautions would be instituted to protect them from others in the same household.

As has been pointed out above, cases in which there is an accompanying scrofulous diathesis tend to be more resistant to treatment. Production of scar tissue by various methods of stimulation has a much poorer response than in more healthy individuals. However, these cases, after treatment with copper citrate ointment or copper sulphate pencil for several months, show a response similar to that noted in a more healthy individual with similar medication for a six weeks' period.

All ocular therapeutics should be supplemented with an abundant diet, especially for those cases in the residential schools, and the importance of this auxiliary measure in the eradication of this disorder in the young is to be constantly stressed.

Serious impairment of vision by the disease can usually be attributed to one or a combination of the following causes:

(*a*) Perforation of the globe due to trachomatous ulcer. The ultimate result of this is a sightless, shrunken eyeball.

(*b*) Dense opacity of the cornea from trachomatous pannus. Infiltrating from above downwards, this process advances into the cornea, accompanied by numerous aborescent vessels. The smoothness, lustre and transparency of the normal structure is thereby converted into a rough, dull, opaque structure somewhat similar to that of irregularly heavily frosted glass: the eyeball frequently assumes the appearance of a boiled onion.

(*c*) Diffuse corneal opacities form trachomatous ulcers. When situated in the area of the pupil, these may greatly limit or even totally prevent the transmission of visual stimuli to the retina.

(*d*) Secondary glaucoma from the formation of plastic exudates, with consequent blocking of the filtration angle.

Many physicians use the term granulated lids as synonymous with a blepharitis in which the small incrustations along the lid margin appear as granules somewhat similar to small pieces of granulated sugar. This term conveys little to the patient as to the seriousness of the disease and on this ground the profession might be well advised to abandon this terminology and use the correct term, trachoma, where specifically indicated. In addition, patients should most certainly be made aware of the malignant and communicable character of their disorder.

Control

The experience of other nations has demonstrated that once trachoma has been introduced into a population to any degree, the process of extermination is to be measured in terms of years and not months. Since it has obtained such a hold among the Indians of Canada, there is no evidence to suggest the possibility of rapidly eradicating it. On the contrary, in addition to other factors certain fundamental prejudices which are inherent in the Indian nature must be overcome.

One of the most important steps towards the eradication of trachoma among the Indians will be education. The fatalistic conception that once the disease has become established, nothing can be done about it, must be offset. Special attention is given to the older Indian medicine man, who is encouraged at clinics to note the manifestations and ravages of the disease. At these

clinics demonstrations of groups of children with normal and diseased eyes and eyelids are designed to convey some idea of the communicable nature of the disease. The part played by fingers, hands, towels and wash basins in spreading the disease is emphasized.

The older Indian women view with suspicion any suggestion from a stranger and are inclined to scoff at anything savouring of advice. It is therefore rather difficult, except through the influence of the husband, to stop the practice of wiping the children's faces with the ends of the head scarfs. It is anticipated that in future much less difficulty will be experienced with the younger mothers who have had training in the residential schools.

Because the pupils of to-day will become the parents of to-morrow, it is essential that they be educated regarding this disorder, and the school is the natural and most advantageous place from which to spread propaganda. These residential schools should prove most valuable in acquainting the rising generation with the danger of the disease and its manner of propagation. The pupils, many of whom are under treatment, learn the importance of early and consistent treatment. Any treatment carried out in the schools is, of course, rendered as gently and painlessly as possible.

Criticism of the policy of treating cases in these schools is justifiable on the basis that such cases are a grave menace to the uninfected pupils and should never have been admitted to these institutions. Certainly the ideal is trachoma-free schools. But sending these children back to their homes would result in their getting but little medical attention or the proper nutrition, which is so necessary an adjunct.

The common roller towel has been eliminated from these schools and each child is provided with an individual towel, basin and soap. Positive cases have their pillows, sheets, etcetera, marked with a large square of red unbleachable material. Strict discipline is maintained regarding the use of toilet articles. Presupposing possible infection during play hours in the late afternoon, each child who is negative receives prophylactic drops of zinc sulphate (1/4 per cent) every evening. Towels, handkerchiefs, etc., from infected pupils are boiled separately for twenty minutes before being laundered. Antiseptics such as creolin, lysol, etc., and their derivatives are discouraged for laundry purposes as there is always a danger that the extremely alkaline reaction of the water may interfere with their antiseptic properties. Special regulations have been made with respect to the bathing of the trachoma patients and every effort is made to protect the uninfected individual from accidentally contracting the disorder. To date the regulations, wherever carried out, have proved quite satisfactory. Cases developing a corneal ulcer, with consequent marked lachrymation with high infectivity, are especially guarded against.

In conclusion, it may be stated that, compatible with available finances, every effort is being made to keep enthusiasm alive and to remain undeterred by apparent regressions in certain areas. The characteristic chronicity of the disorder will be overcome only by persistent effort. Education of the rising generation, with subsequent co-operation on their part, will undoubtedly prove the most potent factor in the solution of the trachoma problem among the Indians of Western Canada.

Milk Contamination and the Methylene Blue Reduction Test

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IN the whole field of dairy bacteriology there is probably no other subject which has been investigated as thoroughly in as many countries by as many workers with as few conflicting results as the sources of contamination during the production of milk. Yet it has proved difficult to inculcate upon the dairyfarmer a full or even a reasonable appreciation of the essentials of sanitary milk production. This situation may be partly due to failure to recognise the comparative importance of the different sources of milk contamination by many who are responsible for milk control and milk improvement programs.

Heretofore no attempt has been made to interpret the comparative importance of the different sources of milk contamination on the farm in terms of the methylene blue reduction test. Since this test is used extensively in this province with considerable success and since climatic conditions in Alberta, particularly night temperatures, differ so materially from those of the other parts of the world where this problem has been investigated, it seemed desirable to study this subject using the methylene blue reduction test as the measure of the bacterial content of the milk. A bacteriological survey, therefore, of the milk production methods in use on twenty farms was undertaken.

Farms Selected

Twenty farms were selected, the majority of which were having difficulty in maintaining the standard set by the city of Edmonton based on the methylene blue reduction test, namely, a minimum reduction period of 5½ hours for milk shipped to milk plants for pasteurization, as an active milk improvement programme has proceeded for some years in the Edmonton district where these data were collected. Since well over 90 per cent of the milk arriving in this city in 1932 had a reduction time of not less than 5½ hours, the anticipation of finding fairly high standards of general cleanliness on the farms was, in the main, realized. This fact should be borne in mind in interpreting the results to follow.

Milk Utensils

These consisted of a covered milking pail, an eight gallon milk can, a metal strainer with the usual tissue filtering disc, and a stirrer.

Experiments were made using sterile utensils—protected by wrapping paper and autoclaved at 17 pounds' pressure for 1 hour—and as ordinarily prepared on the farm with chemical or hot water disinfection.

Sampling

With one exception, all samples were taken during the morning milking and no attempt was made to cool them. The maximum time elapsing between sampling and testing was 4 hours, while the usual time was not over 2 hours. The major portion of the investigation was conducted during the cold winter weather and at no time did a hot night precede a survey.

Bacteriological Methods

Standard Methods of Milk Analysis (A.P.H.A., 1929) was followed as closely as possible for all bacteriological procedures, except that one per cent of glucose was added to standard nutrient agar for the plating medium.

The standard methylene blue reduction test was supplemented in almost all cases by a modified test. The modification consisted of shaking the tubes every half-hour during incubation in the constant temperature water-bath which was maintained at 37°C.$\pm\frac{1}{2}$°. This technique has the effect of shortening the reduction times of the majority of milks of the class under discussion in this paper and, we believe, gives more nearly accurate results than the standard technique. Reduction times are reported in hours and minutes, 5:15 meaning 5 hours and 15 minutes.

Technique used in Microscopic Counts

Sixty fields were counted in the microscopic technique, with the exception of those examinations made at the moment of reduction, in which case the number varied. We question the accuracy of many of the figures cited as the microscopic counts, particularly in the case of the milks with low bacterial content, for the following reasons:

1. Where the bacteria, especially small cocci, occur singly, it is frequently impossible to distinguish them with certainty from non-bacterial matter.

2. The uneven distribution of the bacteria in the milk and the small number of bacteria in an entire smear. An entire smear (0.01 cc. of milk) would contain only 100 bacterial cells if the original milk contained 10,000 bacterial cells per cc. There were approximately 6,000 microscopic fields per smear. Thus in the example cited there would be an average of only 1 bacterial cell per 60 fields. The normal uneven distribution of these bacteria is exaggerated because of clumping and, therefore, it was not infrequently found that many times 60 fields had to be examined before an organism was encountered. This is illustrated in the following figures of nine udder milks not otherwise reported in this paper. These udder milks were carefully drawn into sterile flasks or test-tubes from half-milked udders.

Milk Number	Number of fields examined before finding 1st cell	Number of cells in the largest clump	Count per cc. 60 fields	Count per cc. 1000 fields	Count per cc. 2000 fields
1	189	2	0	7,200	
2	57	148	10,000	39,600	139,800
3	158	2	0	7,800	
4	471	2	0	3,600	
5	47	2	370,000	48,600	34,800
6	16	34	90,000	63,600	119,700
7	29	350	90,000	81,600	200,700
8	10	110	960,000	175,000	
9	75	97	0	107,400	

PLATE COUNTS AND METHYLENE BLUE REDUCTION TIMES OF LOW COUNT RAW MILKS

It was soon observed that many samples of herd milk had very low plate counts and unexpectedly short reduction times, a few examples being given in Table 1. This relationship is not confined to the Edmonton district.

Dorner (1933) found that, of 531 samples of milk with bacterial contents of less than 50,000 as shown by the Burri technique, 129 had reduction times of less than 6 hours.

TABLE I

THE PLATE COUNTS AND REDUCTION TIMES OF 12 RAW MILKS

Milk Number	Reduction Time	Plate Count	Milk Number	Reduction Time	Plate Count
1	2:30	150,000	13	5:15	10,500
2	3:00	75,000	14	5:15	5,300
3	3:15	43,900	15	5:20	11,300
4	4:10	39,500	16	5:30	13,000
5	4:15	26,000	17	6:00	26,500
6	4:30	24,000	18	6:30	8,300
7	4:30	9,500	19	6:30	172,000
8	5:00	10,000	20	6:45	550
9	5:00	41,600	21	7:15	300
10	5:10	12,500	22	7:15	1,200
11	5:15	6,000	23	7:30	450
12	5:15	14,000	24	7:45	400

In the past it has been usual to attribute such discrepancies to the inaccuracies of the reduction test. Due to the work of Skar (1913, 1931), leucocytes have been viewed with suspicion in connection with their reducing properties in milk. A later communication from the Department of Dairying, University of Alberta, will review this question more fully than can be done here. It may be said, however, that we have been unable to find that leucocytes influence reduction times of herd milks.

All the milks reported in Table 1 were produced in dairymen's utensils, while no sample of milk drawn into sterile utensils on 16 farms reduced methylene blue in less than 10 hours, although many had plate counts as high as some of those reported in Table 1. The plate counts of 40 samples of milk produced in sterile utensils varied between 100 and 7,300. In the majority of cases the keeping time at room temperature was noted and it was observed that without exception the samples produced in sterile utensils had a longer period of usability than any sample produced on the same farm in the dairyman's utensils. These observations proved that bacteria were present in these milks which the methylene blue reduction test measured more adequaely than did the plate count. It was suspected that the clumping of the bacteria was responsible for the discrepancies noted, since it is universally recognized that bacteria from certain sources tend to exist in clumps. This is particularly true of those which are introduced into milk by the utensils. Microscopic counts were, therefore, made of a large number of milks of which those reported in Table 2 are representative. In practically all cases small clumps containing 10 to 15 cells were found while large clumps of 50 to 100 or more cells were frequent.

If the reduction of methylene blue in milk is the result of bacterial action then a microscopic examination of the milk at the moment of reduction should reveal sufficient bacteria to account for that phenomenon. Table 2 presents such data for 12 herd milks.

It was found difficult to make accurate counts of these smears because of the large clumps, and the figures are really estimates. Nevertheless, because the number of fields examined varied while the finished counts show considerable uniformity, it is believed that the estimates were made with a fair degree of accuracy and in any case represent the minimum number of bacteria present. The plate counts of milk made at the moment of reduction are reported by Thornton and Hastings (1929) to average approximately 21 million. It is evident from the figures presented that the bacterial content of milk at the moment of reduction is higher than is usually indicated by the plate count, the low plate counts being due, partly at least, to the clumping of the bacteria. It is also apparent that the milks reported in Table 2 contained

sufficient bacteria to account for reduction and that the plate count of the original milk was in many cases misleading.

TABLE 2

MICROSCOPIC COUNTS OF 29 SAMPLES OF HERD MILK DRAWN INTO PRODUCERS' UTENSILS

Sample number	Reduction time	Plate count	Microscopic Counts		
			Groups	Individuals	At moment of reduction
1	0:45	200,000	40,000	640,000	
2	2:15	2,200,000		6,860,000	80,640,000
3	2:15	579,000		2,200,000	51,840,000
4	2:30	158,000		1,360,000	
5	3:12	43,900	190,000	300,000	
6	3:25	174,000		2,060,000	
7	3:30	273,000	170,000	1,540,000	
8	4:05	21,000		50,000	45,360,000
9	4:10	39,000	170,000	280,000	
10	4:45	27,500		90,000	72,000,000
11	5:00	41,650	40,000	70,000	
12	5:10	12,550	150,000	230,000	
13	5:15	9,450	160,000	1,000,000	
14	5:15	15,750	70,000	420,000	
15	5:15	34,200	90,000	1,250,000	
16	5:20	11,225	140,000	390,000	
17	5:30	70,000		460,000	66,000,000
18	5:45	29,800	70,000	180,000	
19	5:45	35,500		40,000	46,680,000
20	6:00	205,000		740,000	93,600,000
21	6:15	12,000		140,000	165,600,000*
22	6:30	67,000		80,000	115,200,000
23	6:30	14,500		90,000	87,000,000
24	6:45	550		180,000	
25	7:15	1,200		380,000	
26	7:15	51,500		160,000	184,200,000
27	7:15	114,500		470,000	90,600,000
28	7:30	450		80,000	
29	7:45	400		0	

*Count made after 8 hours' incubation, not at the moment of reduction.

Extremely low plate counts for correspondingly short reduction times were observed much less frequently during the winter when the cows were stabled than during the summer when the cows were stabled only to milk. It is probable that manurial contamination is greater in the winter than in the summer and that manurial contamination tends to give closer correlation between plate counts and reduction times than does utensil contamination. Not enough data have been collected as yet, however, to justify a definite conclusion on this point.

THE COOLING OF MILK

The relationship between bacterial activity in milk and the temperature at which the milk is held is so thoroughly known that the subject may seem exhausted. Nevertheless, some important aspects of this relationship have been understressed and merit attention.

(a) *Effect of Temperature on Bacterial Life in Milk Cans*

The importance of the relationship between atmospheric and milk temperatures has received so much attention that it has masked the relationship

between atmospheric temperatures and the growth of bacteria in non-sterile utensils. With climatic conditions such as we have in Alberta, *i.e.*, hot days and cool nights in the summer and cold outside and warm inside temperatures in the winter, the effect of temperature upon the condition of milk utensils was found to be greater than had been suspected. It is the practice on some farms to store the utensils other than shipping cans in the warm kitchen at least during the winter months, and such practices were found to influence the quality of the milk produced in these utensils. For a short period each spring there is a sudden increase in the amount of substandard milk shipped into Edmonton and it has been usual to blame lack of cooling of the milk. It has not infrequently happened in our surveys that the morning milk was of low bacterial content while the evening milk, although adequately cooled, had a short reduction time. This led to the suspicion that day temperatures permit greater bacterial growth in the utensils than do lower night temperatures.

Several experiments were, therefore, conducted to determine the effect of temperature upon bacterial life in eight-gallon milk cans. The results, reported in Table 3, are the average in each experiment of either 4 or 8 cans. The cans were in all cases inoculated with a mixed flora growing in milk and the treatment accorded them varied with each experiment but, except for storage temperature, was constant within any one experiment. The results of different experiments are not comparable but are directly comparable within the experiment. The cans are rinsed with 1 litre of sterile water and the microscopic and plate counts were made from this rinse water. The methylene blue reduction times were obtained by adding 1 cc. of this rinse water to 10 cc. of a sterile methylene blue milk mixture and observing the reduction time at 37°C. The figures reported as the number of bacteria which would be added to the milk by the cans were computed from the plate and microscopic counts of the rinse water.

TABLE 3

THE EFFECT OF TEMPERATURE UPON BACTERIAL LIFE IN MILK CANS

Experiment number	Storage place	Hours of incubation	Approximaximum temperature degrees F.	Approximinimum temperature degrees F.	Methylene blue reduction time	Number of bacteria contributed by can per cc. milk when filled. Computed from	
						Plate count	Microscopic count
1	Outdoors	17	6	−2		15	
	Indoors	17	61	61		148	
2	Outdoors	14	−2	−4		1,215	
	Indoors	14	72	72		1,755	
3	Outdoors	12	40		6:00	300	4,860
	Indoors	12	77	77	3:30	28,080	143,100
4	Outdoors	21	sub-zero	−30	2:45	3,867	36,450
	Indoors	21	70	70	1:25	70,740	170,100
5	Outdoors	16	58	37	4:30	6,000	
	Indoors	16	72	72	1:45	600,000	

It will be seen that the temperature at which milk utensils are held between

milkings has a marked influence upon bacterial life in them (some of these data represent the bactericidal effect of different temperatures rather than or as well as the growth effect). During the winter or at night when temperatures are low bacterial growth may be entirely checked in utensils held at outside temperatures and it is probable that, on the other hand, lack of cooling of the milk is frequently held responsible for troubles caused by storing non-sterile utensils at temperatures sufficiently high for bacterial growth.

On 2 of 20 farms included in this survey lack of cooling was definitely a major problem. On these 2 farms no cooling whatsoever was attempted, the milk being left overnight in the barn to avoid freezing. Lack of cooling was a questionable factor on 1 farm and its effect was not sufficient to be measured by the methylene blue reduction test or the plate count on 17 farms. In no case was lack of cooling a factor when the temperature of the milk after overnight storage was as low as 55° F. Attention is again called to the fact that not a single warm night was encountered during the period of these investigations. These results are not to be interpreted, however, as meaning that this temperature at the farm is sufficiently low to ensure the arrival of cold milk in the city after a long truck drive in the heat. Moreover, we do not suspect that cooling is invariably done on all these farms as efficiently as was the case during the time each farm was under observation.

(b) *Importance of Low Initial Counts*

There is another feature of the cooling problem which deserves mention. Let us assume that we are interested in the growth of 2½ million bacteria and that their generation time in uncooled milk is 1 hour. It is immaterial whether these assumptions are ever exactly true in practice or if our interest is related to the chemical changes the bacteria effect, the methylene blue reduction time or the plate count. If now we suppose a milk containing 2½ million bacteria at zero time, then we will have a growth from 2½ million in 1 hour. If, on the other hand, we hypothesize a milk containing 10,000 bacteria, then it will take approximately 8 hours to produce a growth of 2½ millions.

The greater importance of cooling poor milk than milk of very low bacterial content is apparent. This argument should not be used to excuse prompt and adequate cooling but the principle illustrated above, when added to the germicidal action of fresh, milk tends to act as insurance on those occasions of laxity to which almost every dairyman is subject.

Surface Coolers are Unsatisfactory

Producers in parts of this province have at times been advised to install surface coolers, advice which should be given with great discrimination. The general introduction of such apparatus in Alberta would probably do more harm than good because the surface cooler is a most difficult piece of dairy equipment to sterilize. A farm using a surface cooler was included among those reported in this paper and during the period it was under observation satisfactory disinfection was accomplished. It is not to be expected, however, that for years to come the average dairyman of this province will give his equipment the meticulous care that this cooler received during

our investigation. This discussion of the surface cooler refers of course only to the bacteriological aspects of the milk cooling problem and in no way relates to the removal of bad flavors and odors from milk.

A Practical Method of Cooling

The milk producers of this province have available and are now using a method of cooling which when properly performed is simple, efficient and inexpensive. This method is to immerse the cans of milk in water fresh from the well. In August, 1933, the highest temperature of water drawn by us from 26 wells in this district was 47° F. and the lowest was 39.5° F. Twenty-four of these wells contained water not above 44° F. The highest minimum daily atmospheric temperature recorded by the Dominion Government Meteorological Service at Edmonton during July and August of 1933 was 59° F. and the mean minimum temperature for the same period was 48.85° F. The cold well waters and the cool nights of this province place it in an advantageous position for the production of dairy products.

THE COVERED VERSUS THE OPEN PAIL

Due principally to the work of Ayres, Cook and Clemmer (1918), those in charge of milk control programs have been inclined to lay great stress upon the use of the covered pail. These investigators showed that the number of bacteria, as measured by the plate count, which the covered pail keeps out of milk varies tremendously with the general cleanliness of the cows and barns but is, under the filthiest conditions, less than may be introduced by non-sterile utensils.

As has been previously stated, the standard of general cleanliness maintained in the barns and herds in the Edmonton milk shed is comparatively high and the use of the covered pail has been found here to be one of the minor factors in the production of low count milk. It is difficult to devise satisfactory experiments to prove this with the class of milk with which this paper is concerned since it is impossible to milk the same group of cows into both types of pails at the same time. On each of the first 7 farms reported in Table 4 both pails were used at the same milking but with different groups of cows. On the first 5 of these farms examinations were made of udder samples from each cow and nothing was noted to cause suspicion that the milk of any cow included in the experiments was in any way abnormal. On farm number 29, however, it was discovered that a cow with a history of bad mastitis had been in the covered pail group and the data are included here to illustrate the necessity for care in the interpretation of figures relating to this problem. On farm number 7 the herd was divided into two groups of jerseys and two groups of holsteins, each group being milked into each type of pail, time being the only variable. The utensils used in these experiments were, of course, sterile. We believe that the averaging of the figures in each column is not warranted.

Because any differences noted are not outside the experimental error of the methods employed, the conclusion is justified that the effect of the covered pail was not sufficient to be measured with certainty by the plate count or the reduction test. These experiments have no bearing whatever upon the efficacy of the covered pail as a protection from falling dirt.

TABLE 4

THE INFLUENCE OF THE COVERED PAIL ON MILK CONTAMINATION

Farm number	Covered Pail			Open Pail		
	Plate count	Standard Reduction time	Modified Reduction time	Plate count	Standard Reduction time	Modified Reduction time
16	100	>15:00	9:30	450	12:30	8:30
18	1,500	12:10	8:40	2,300	13:10	8:40
20	3,700	14:15	6:45	850	14:15	8:45
22	550	>15:00	13:30	1,500	>15:00	
26	500	12:15	8:35	450	13:15	8:55
26		13:00	6:30		16:30	7:30
26		14:45	9:30		14:45	7:45
28	550	11:30	9:30	3,100	10:30	7:30
29	17,000	6:30		525	11:45	9:00
7-1	790	14:30	11:00	1,250	16:00	9:00
7-2	680	14:00	10:00	450	13:45	9:45
7-3	250	15:00	7:45	350	>17:00	10:30
7-4	950	>17:00	10:15	2,050	17:00	7:00

>Greater than. <Less than.

THE IMPORTANCE OF UTENSILS IN MILK CONTAMINATION

The part played by utensils in milk contamination is so well known to dairy bacteriologists that it need not be discussed here except to be put in terms of the methylene blue reduction.

In the present investigation, sterile utensils were substituted for the dairymen's utensils on 20 farms on 16 of which difficulty had been experienced in maintaining the standard of 5½ hours as set by the City of Edmonton. The milk produced in sterile utensils on 16 of the 20 farms had reduction times of not less than 10 hours, as reported in Table 5. The milk from farm number 2 had a modified reduction time of 7:15 and since this technique materially shortens reduction times of this class of milk it is probable that the standard reduction time would have been not less than 10 hours. The test of the milk from farm number 3 was not observed between 9 and 12 hours during which period reduction took place. In the cases of farms 9 and 29, discrepancies will be noted between the first two columns. This is due to the natural variation so frequently observed in the standard methylene blue reduction test when applied to this class of milk. On farm number 14 mastitis was found to be prevalent, accounting for the short reduction time of the milk from the sterile utensils.

On each of 18 farms the sterile utensil milk, after sampling, was poured into the producer's cans and the reduction times of these milks determined (Table 5). If the condition of these 18 or more cans is representative, it would seem that the pails and strainers are contributing to the milk the majority of the bacteria. It is questionable, however, if these data are representative of the condition of milk cans on the farm, since all samples, with the exception of those from farm number 4, were collected in the morning and the investigations were largely conducted during the winter. While other utensils may be stored overnight in a warm place, cans are most frequently left outside.

TABLE 5

RESULTS USING STERILE AND PRODUCERS' UTENSILS

Farm No.	Sterile utensils	After pouring from sterile utensils into producer's utensils	Producer's utensils
1	13:00		5:00
2	*7:15		*3:30
3	>9:00 <12:00	>9:00 <12:00	7:15
4	12:45	8:30	<8:00
5	13:00	13:00	10:30
6	16:00	14:00	>10:00
7	10:00	9:00	8:30
8	12:15	11:30	8:30
9	8:15	10:00	6:00
11	10:45	10:30	5:00
12	12:00	11:00	5:10
13	12:05	9:00	4:45
14	5:45	5:15	8:45
16	>15:00	>15:00	6:45
18	12:10	9:40	11:55
20	14:15	14:00	7:15
22	>15:00	>15:00	4:05
26	12:15	12:45	11:15
28	11:00	6:45	7:25
29	11:45	12:15	5:25

*Modified reduction times.

We have found, also, that the condition of both cans and other utensils varies quite materially on the same farm. On the majority of the farms visited efforts were being made by the dairymen to sterilize the utensils, but without uniform success. This is illustrated by the reduction times of samples from 6 cans of morning milk drawn into the producer's utensils on farm number 6 (Table 6). This lack of uniformity was observed on a number of farms using either chemical or hot water disinfection of the utensils. The need for a more efficient method of sterilization is at once apparent.

TABLE 6

PLATE COUNTS AND REDUCTION TIME OF SAMPLES FROM ONE FARM

Can Number.....	1	2	3	4	5	6
Reduction time.....	7:00	10:30	8:45	8:00	4:45	7:00
Modified reduction time.	4:45	7:30	6:00	5:50	4:30	5:15
Plate count.....	108,000	2,300	2,080	44,000	304,000	165,000

ABNORMAL MILKS

Although udder milks from individual cows occasionally have short reduction times and although such milk was discovered to have been included in the sterile utensil group on a number of farms, in only 2 cases did this result in reduction times of less than 8 hours in the mixed milk. On one farm the mixed milk of 5 cows milked into sterile utensils had a reduction time of 6:30 due to the inclusion of the milk of 1 cow which had suffered a number of recognised attacks of mastitis. The sterile utensil milk on another farm had

a reduction time of 5:45 but an examination of the 42 cows in the milking line on this farm showed that at least one-third were suffering from mastitis as indicated by an excessive leucocyte or long-chain streptococcus count or short reduction time of the individual udder milks.

The reduction times of udder milks obtained from 2 cows within 48 hours after freshening were respectively 5:00 and 6:15. The reduction time of an udder sample drawn from a cow very far advanced in the lactation period was 45 minutes.

The conclusion seems warranted that, while mastitis or other abnormal milk may cause the reduction of methylene blue in herd milk in 5½ hours or less, this probably infrequently happens except under very careless herd management and in any case such milk should never be mixed with a city milk supply.

DISCUSSION

Is a standard of 5½ hours unreasonably high?

Because milk is a food, particularly an infant food, and is exceedingly susceptible to bacterial action, producers, distributors, consumers and public health officials will probably all be in unanimous agreement that milk so used should be produced in surroundings as clean as the laws of nature and of economics permit, from cows as free from disease as is possible in our present state of knowledge and that the milk should be kept adequately cooled. If these premises are conceded, the surveys reported in this paper indicate that a methylene blue reduction time of at least 5½ hours is not an unreasonably high standard. They show also that such a standard is not easily maintained without an adequate system of utensil disinfection. Since under the conditions laid down above the use of sterile utensils results automatically in a milk of much higher bacteriological standard than 5½ hours, it seems probable that between the limits of 5½ and 8 hours the costs of production will not increase proportionately with the raising of the standard.

The Accuracy of the Methylene Blue Reduction Test

There is some difference of opinion as to the degree of accuracy exhibited by the methylene blue reduction test especially when applied to milks of low bacterial content (Johns, 1930, Thornton and Hastings, 1930, and Thornton, 1933). It may appear that the findings reported in the present paper are at variance with the opinion expressed by Thornton and Hastings that this test should not be considered reasonably accurate after the 5½-hour period. Nothing was observed in the course of these experiments to prove the opinion of Thornton and Hastings unsound. It has been found, however, that the methylene blue reduction test measures the bacterial content of a great many of the milks at present arriving in Edmonton more accurately than does the plate count. The advisability of classifying milks beyond the 5½-hour line is a matter of opinion. In any event, such a classification will entail a more careful interpretation of results than is the case with milks having reduction times below 5½ hours.

SUMMARY

Bacteriological surveys of the milk production methods in use on 20 farms producing milk for the Edmonton fluid milk market lead to the following results and conclusions:

1. The only factors which were found to cause singly the reduction of methylene blue in herd milk in less than 5½ hours and which alone or in combination were invariably the major cause of difficulty in maintaining a standard of 5½ hours are:

(a) Utensil contamination.
(b) Lack of adequate cooling of the milk.
(c) Pathological or abnormal milk.

2. When the predominating flora is from the udder or non-sterile utensils, plate counts of milk are apt to be misleading due to the clumping tendency of the bacteria from these sources. As a milk improvement program progresses and standards of general cleanliness are raised, bacteria from the udder and from non-sterile utensils tend more and more to predominate in the milk.

3. Despite its inaccuracies, the methylene blue reduction test, being less influenced by clumping, measures these bacteria more accurately than does the plate count.

4. No proof was forthcoming that the reduction of methylene blue in herd milk is related to the feed of the cattle or to the leucocyte content of the milk.

5. Milk with a methylene blue reduction time of over 5½ hours was produced on each of the 20 farms by no other change in the technique usual on these farms than to use sterile utensils.

6. Herd milk which will not reduce methylene blue in less than 5½ hours is so easily produced in the Edmonton district that no dairy farmer need have difficulty maintaining this standard if adequate utensil disinfection is effected.

7. Under conditions now prevailing in this district the covered milk pail is a negligible factor in protecting milk from bacterial contamination.

8. The temperature at which they are stored between milkings is a major factor in controlling bacterial growth in nonsterile utensils.

9. During warm weather when inadequate cooling of the milk is suspected increased bacterial growth in the utensils is frequently responsible for milk of poor quality.

10. The bacterial content of milk at the moment of reduction is higher than is indicated by the plate count.

11. There is urgent need for a simple, efficient and inexpensive method of applying disinfection to milk utensils on the farm.

Acknowledgments

Our thanks are due to those milk concerns of Calgary and Edmonton whose financial assistance made this investigation possible, to the City of Edmonton Board of Health for providing transportation and to the Department of Animal Husbandry, University of Alberta, and numerous dairymen who gave willing cooperation.

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EDITORIAL SECTION

POLIOMYELITIS IN CANADA DURING RECENT YEARS

THE publication in this issue of the Journal of a detailed account of an epidemiological investigation of poliomyelitis in Quebec in 1932 brings to mind the outbreaks in other provinces since 1927.

In that year the northern section of Alberta was visited by a severe epidemic of 354 cases, of which one-third occurred in the city of Edmonton. The severity of the outbreak was measured not only in the toll of 53 deaths, but in the large number who suffered paralysis. So serious was the problem presented that an orthopaedic hospital of 60 beds had to be erected to provide treatment for the many who were seriously crippled. In the following year the disease appeared in Manitoba, 435 cases and 37 deaths being recorded. Ontario suffered serious outbreaks in the two years following, during which period 1,229 cases and 87 deaths were reported. After thus visiting in turn the western provinces and Ontario, the disease appeared in Montreal and its vicinity in 1931, 1,078 cases being recorded. In 1932 the epidemic centred largely in Quebec city and the adjoining area. Of the 784 cases reported, 240 were in the city proper. Each of these epidemics has received careful study and valuable reports have been published in the Journal. The announcement of the possible value of convalescent human serum in early treatment by Aycock and Luther just prior to the outbreak in Manitoba was followed in that province by an immediate programme for the collection and use of serum. An adequate service of diagnosis and treatment with serum was promptly organized by the provincial and municipal departments of health and by the medical profession and proved most effective. Anticipating the outbreak, Ontario was well prepared in the following year to meet the epidemic, which centred chiefly in Ottawa and eastern Ontario. The good results of the organization in Manitoba were duplicated in Ontario.

There is much in the Quebec report that is highly instructive and of particular value to the epidemiologist. Of unusual interest is the reference to the subject of non-specific immunity. The possibility that the incidence of poliomyelitis might be less in children who had

received diphtheria toxoid was suggested in 1932 by Armstrong of the United States Public Health Service. This interesting speculation was based on studies conducted in the National Institute of Health, Washington, by Armstrong, Harrison and Dyer. They believe that there is evidence that the increased resistance occasioned by specific infection is accompanied by an increased resistance to the subsequent action of various infectious agents or toxic substances. In a recently published report these authors point out that though this increased resistance is only relative, it may be sufficient to modify the course of subsequent infections and be of some value in preventing certain diseases, such as poliomyelitis or post-vaccinal encephalitis. Observations were made by Harrison of a group of 159 cases of poliomyelitis, and of a suitable control group. The results were inconclusive and the hope was expressed that further observations might be made by others in communities where poliomyelitis appeared. Knowing of these observations, Dr. Foley made a careful study of the incidence of this disease among children who had received toxoid. The results as recorded in this paper are most interesting and are favourable to the conclusions of Armstrong and Harrison. The subject is a fascinating one to the immunologist and may be of practical interest.

Since the Manitoba epidemic in 1928 convalescent or immune human serum has been used in the early treatment of cases in each of the provinces visited by the disease. In each there has been a very definite expression of the value of this treatment. It is not possible, however, to draw definite conclusions from these results, as the observations were not controlled by adequate numbers of untreated patients under the conditions of a scientific experiment. The finding in the Quebec epidemic that the use of serum proved of marked value is in accord with the conviction of those who have directed control measures in recent epidemics of this disease.

The prevention of unnecessary crippling and deformity is a matter which needs as widespread a knowledge as that relating to the early diagnosis of the disease and the use of serum. Dr. Jean Macnamara of Australia has provided a clear outline of the proper method of aftercare in an article* which was published during the Ontario epidemic. The factors which operate to produce deformity are fatigue of the weakened muscles and the lengthening of partially paralysed muscles, resulting in the development of contractures. If provision could be made in every province for supervision of the aftercare by a specially trained nurse acting under the advice of a consultant surgeon provided by the province, a real advance would be made in reducing the number of cripples, so many of whom owe their condition to this disease. The attending physician is only too willing to continue the supervision of the case, but he requires the assistance of a specialist. Deformities are not essential sequalae of the disease, but are in every instance preventable.

This Journal, 23: 517, 1932

TWENTY-THIRD ANNUAL MEETING

CANADIAN PUBLIC HEALTH ASSOCIATION

MONTREAL, JUNE 11TH - 13TH

Convention Headquarters: WINDSOR HOTEL

WINDSOR HOTEL, MONTREAL

FINAL arrangements have been completed for the programme of scientific sessions and of entertainment. On Monday morning the Sections of Industrial Hygiene and Vital Statistics will present programmes of particular interest. Montreal's interest in industrial hygiene is well known and industrial physicians from various centres in eastern Canada will take part. Following the addresses of welcome by His Worship Mayor Houde and Dr. S. Boucher, Director of the Department of Health, Montreal, Dr. Alphonse Lessard will deliver his presidential address. Few subjects are of greater importance to the medical profession and to public health officers than the relationship of public health to medical care. This subject will be discussed by Dr. A. Grant Fleming of McGill University. Dr. W. J. Bell, Deputy Minister of Health, Ontario, will outline "The Next Step in a Generalized Programme of Public Health Nursing". On Monday evening the Administrative Council of the Association will meet for the discussion of a number of questions of vital importance to the Association.

Four Section meetings will be held on Tuesday morning, presenting recent work in the fields of public health engineering, public health nursing, vital statistics, and laboratory work. In the afternoon a programme of field visits arranged by the Provincial Bureau of Health and the Department of Health of the city is provided. On Tuesday evening, the members will be tendered a dinner by the province of Quebec and the city of Montreal, and the Association will be addressed by the Honourable L. A. David, K.C., Provincial Secretary of Quebec and Honorary President of the Association. Greetings from the American Public Health Association will be conveyed by Dr. Haven Emerson, President, and by Dr. John A. Ferrell, of the Rockefeller Foundation.

The programme will be continued with important sessions on Wednesday morning presenting the subjects of public health engineering, public health nursing, mental hygiene, laboratory work, and vital statistics. A programme will also be provided by the Canadian Tuberculosis Association. The closing session on Wednesday afternoon, with the Canadian Tuberculosis Association, will be devoted to various aspects of tuberculosis. Advances in the control of this disease in Saskatchewan, Ontario and Quebec will be outlined by Dr. C. G. Shaver, Dr. R. G. Ferguson and Dr. Auguste Leboeuf. In addition, a study of

maternal mortality will be presented by Dr. J. T. Phair and Dr. A. H. Sellers, and Dr. Jean Gregoire will discuss the inspection of health units.

Few programmes of the Association have presented a wider range of subject material or have afforded a better opportunity for public health workers to obtain authoritative information concerning the recent advances as recorded in the various provinces of Canada.

Field Visits

Of outstanding interest is the provision of visits to the county health unit of Terrebonne County, with headquarters at St. Jerome, and to the county health unit for St. Johns. Through the kindness of the Provincial Bureau of Health, transportation is being provided and members and guests will have the privilege of seeing at first hand the work of these units. These visits will be made on Tuesday afternoon. Ample provision has also been made for visits to the Department of Health of the city of Montreal. Members of the Public Health Engineering and Laboratory Sections will find that the local committee has made excellent arrangements for visits to centres of particular interest.

Entertainment

The local Committee on Arrangements are pleased to announce that on Tuesday evening, June 12th, a dinner will be tendered to the members of the Association by the Provincial Government of Quebec and the City of Montreal. The dinner will mark the twenty-fourth anniversary of the Association. Arrangements have been made for the holding of luncheons by several of the Sections of the Association.

Members desiring to enjoy a game of golf during their visit will find that provision has been made at several of the leading clubs.

Transportation

After careful consideration the Committee on Arrangements recommended that the use of the Summer Tourist plan would be most satisfactory. This eliminates the difficulties and limitations pertaining to the purchase of tickets on the Standard Certificate plan, allowing also stop-over privileges until October. No special arrangements are being made, therefore, in regard to transportation.

Hotels

The convention headquarters will be the Windsor Hotel. Other conveniently located hotels include the Mount Royal, the Ritz-Carlton, the Queen's, the Place Viger, the LaSalle and the Ford.

LOCAL COMMITTEE IN CHARGE OF ARRANGEMENTS

MR. T. J. LAFRENIÈRE, *Chairman*
MR. M. H. MCCRADY, *Secretary*

DR. J. P. DÉCARIE — DR. S. BOUCHER
DR. J. A. BAUDOUIN — DR. A. GRANT FLEMING
MISS T. V. BARRETT — MR. G. A. GRAFFTEY
MR. AIME COUSINEAU

MENTAL HYGIENE

A Mental Hygiene Interest in the Infant

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THERE is a new social attitude toward infancy and childhood. It is peculiar to our present century, although having its roots in the past, and is to a considerable extent born of a broadening mental hygiene programme. Clinics, welfare centres and special playgrounds encourage the increase and spread of knowledge about the development and health of children.

Within this attitude there is a new emphasis on the fact that there are other things of importance for normal development besides physical care. There is a changed appreciation of the importance of play. The needs of an active child-mind are being explored. The all-important characteristics of training, namely, regularity and consistency, are receiving fresh significance in the light of possible future implications for the child's growing personality. In all this, psychology and education are finding new fields for experimentation, and are striving continually to present to parents, teachers and interested workers a dependable and harmonious body of information. And psychiatry is casting an anxious eye in this direction in the hope of finding a reliable basis for the carrying forward of its new preventative interest.

This developing social attitude tends to focus itself around the child as a dynamic social unit, and as deserving of concentrated individual study. Rousseau's "Emile" was the first book to indicate definitely the probable value of this emphasis. It has been followed by a lengthy list of discussions, studies and books on the various aspects and problems of child development. The whole testing movement pushed the field of controlled psychological investigation toward the younger years. Clinicians with a psycho-analytical approach have expressed increased concern in the habits of young children in their designs for overcoming and preventing maladjustments. Educational philosophy has suggested to us that while it is true that education at any stage of development is a preparation for living, it is just as true that life and education are in many respects synonymous. The Montessori movement, the nursery school movement, and the establishment of psychological observation or research centres have contributed continuous initiative and enthusiasm to this new social attitude toward younger children.

Mental hygiene as a part of this new interest is very much concerned with that great population of children called "normal". It is truly anxious, of course, about the "problem" or abnormal child, is sympathetic toward his needs, and is solicitous for his future welfare. But it would primarily, at the present stage of its efforts and interest respecting

preventative measures, like to know this normal individual much better. That healthy little lad out in the morning sunshine and taking his first steps around his play-pen; that bright, blue-eyed youngster making a pile of blocks on the nursery floor only to knock them down and laugh joyously; what is this normality? What is it at all stages in infant development? How can we maintain this normalcy until it more or less takes care of itself?

One writer has presented the following as a picture of the sound, healthy child:

> "I will say it in a few words, warning at the same time that the perfect type, perhaps, does not exist, but if it did, would include: normal developments of physique, both the thorax and other parts of the body, symmetry of figure, good nutrition, color corresponding to the ethnic type; good appetite, digestion and sleep; ability to walk befor e the fifteenth month and to pronounce disyllables well between the twelfth and the eighteenth; the psychic influences delineating themselves after the third or fourth year; security in walking and in movements of the hands; precision in the pronunciation of words; facility in understanding and comprehending what is taught; facility in remembering and in utilizing knowledge; curiosity to know shown through interrogation; necessity for motion; inventiveness of fancy; tendency to assert the ego; respect for parents and for teachers and adaptation to the quitable discipline of the home; good humor, pity for animals, wit and tricks with mates; strength contests in which the sense of superiority prevails; good behavior, order, petty lies (no importance should be attached to petty thefts, sly transgressions and minor falsehoods, for they are part of the normal psychology of that age); promptitude in answering; cleverness, vivacity, joy, self-confidence, courage and so forth. All these are signs of physical health and good character."*

Thus mental hygiene may be seen to have to deal with a selection and classification of somewhat commonplace material. In all this, while it continues its task of curing children of behaviour disorders, it also entertains the purpose of keeping well children well.

The keynote of this whole modern trend is to understand. Now, to understand the child mind and its changing needs and manner of expression is not an easy task. Many of us are inclined to wonder whether there is not a tendency for the guidance of children to be taken over by organizations outside the home; and we complain that modern life is taking our children from us. The new social attitude and approaches to child training are giving them back. At the same time, this return entails a newer recognition of the difficulty of the job of being a parent. The realization of this may lead to the insightful use of the modern understanding and enhance the joys of its successful application.

The Mental Hygiene Clinic

The establishment of psychiatric clinics for child guidance (or should we call it parent guidance!) has received a good deal of consideration by civic welfare interests in recent years. In some places they are designated "child guidance clinics"; in others, "mental hygiene clinics".

The name, "mental hygiene clinic", is usually applied where there is a dependence upon the combined techniques of psychiatrist, psychologist and psychiatric social worker. It is usually constituted to examine deviations in the total functioning of the individual child, as evidenced by disorders of behaviour or personality. Many of these disorders are to be looked upon as serious, not only because of the social disturbances they may create at the time,

*Bianchi, L. "Foundations of Mental Health" (Appleton and Co., New York), p. 60.

but also because they may often be advance signs of mental disease, delinquency or social dependency of one sort or another. Thus, because of the distinctive character of its work and the specific detail of its method, the mental hygiene clinic has established a community service which has given its name a certain prestige.

Essentially, of course, the establishment of a mental hygiene clinic is an aspect of community organization. From the point of view attendant upon this emphasis, the organization of such a clinic or service is somewhat of a treatment or therapy for the community generally. It implies the design to make it more healthy for its inhabitants. So the success of such a therapy may be limited only by the extent to which the community is co-operative on behalf of such an enterprise.

The primary responsibility for the directing of the child's development rests with the parents. However, in our complex social organization the home cannot always be depended upon to meet the needs of the child. Many of the difficulties are still further emphasized when we are dealing with foster homes. Under such conditions, special agencies must often be depended upon to supply this guidance. In this respect, our public schools are salient examples. The church, the family physician and social agencies tend also to assume the part of a special authority in substituting for the home.

The mental hygiene clinic has its part in this regard as well. It may be said of it that it begins to function when these other substitutes run into difficulty because the problems of mental adjustment become too complex. However, its best work is accomplished when all these various auxiliary agencies can be actively co-operative.

This type of clinic has been evolved as a method of bringing together into one study the various possible approaches respecting the development of the child. With an avowed emphasis upon mental characteristics, concern tends to centre around mental endowment, the effect of experiences, behavior tendencies, and emotional status. This is a wide range of interest, and makes demands from fields of psychiatry, psychology, and social work, in order to lead to as full an understanding of the child as possible. The cost of the clinic must be viewed in the light of the invaluable service of its case work on a background of the severity of the difficulties which it has to face, and in terms of its immeasurable contributions to individual and community well-being.

The Clinic at the Infants' Home, Toronto

This mental hygiene clinic was established six years ago. Due to the kindness of the members of the Board of the Infants' Home, and their appreciation of the importance of this service, and with the personal guidance of Miss J. V. Moberly, the General Secretary, clinic accommodation consisting of an examination office, observation room and play room were secured and fully equipped. During its first year, the mental hygiene clinic drew up pertinent forms and determined methods of examination that have served as a splendid basis for its continuous growth. Within the general organization of the Infants' Home,

the clinic was made an integral part of the Home Placement Department, and its development soon required the services of a full time mental hygiene worker. During the past year, the personnel of the clinic has also included the services of a psychiatrist, a psychologist and a psychometrist.

During the first year of the clinic's operation, fifty children were examined; last year (1932-33), the total attendance exceeded five hundred. There has been an increase in the range of problems dealt with and a gradual differentiation of types of examination for the different problems. In all this the aim has been to give the mental hygiene principles governing curative and preventative programmes intelligent interpretation and expression.

The present organization of the clinic aims to maintain and, if possible, increase its value in the general economy of the organization. Practically all children that are considered for adoption are fully examined from psychological and psychiatric points of view with a careful review of all pertinent factors in their developmental histories and family backgrounds. Children displaying training or developmental difficulties constitute another large section of the clinic's clientele. Examinations in such instances include as well as the psychological and psychiatric reviews, a complete survey of the present developmental status of the child and of antecedent conditions. Recommendations are made to the foster-parents by the nurses who are to be appreciated as the mental hygiene clinic in the homes. At all times, a careful check is made of the more difficult and persistent problems and these are brought back to the clinic at regular intervals for re-examination.

Furthermore, the clinic operates with the aim of seeing for complete examination and psychological rating, every child registered with the Infants' Home in so far as this is possible under the present conditions. Besides all this, the clinic interviews the occasional adult client and holds itself ready and willing to discuss problems of a pertinent nature with the nurses and social workers of the institution.

The Infants' Home may be justly proud of its mental hygiene clinic. In the first place, the clinic situation is well adapted to its task, being conveniently located and quite well equipped. Secondly, it is the only mental hygiene clinic in Canada (so far as is known) existing exclusively for the psychiatric and psychological examination of infants, that is, children under three years of age. This is especially outstanding when we add that it is for the exclusive use of the one institution of whose organization it forms a part.

Although having a full programme of clinical activity, the clinic is trying not to lose sight of the fact that great possibilities for research work with the infant exist in such a situation. Records are carefully kept, and summaries of these are made from time to time. On the psychometric side, rating scales respecting developmental level are being tested out and the age level for the reliable rating of infants is being gradually lowered. With patience and perseverence, a small but important research programme is being carried forward.

HARRY L. ABRAMSON, M.D.

DR. HARRY L. ABRAMSON, Director of the Bureau of Laboratories of the New Brunswick Department of Health at Saint John, N.B., since 1918, died in the Rockefeller Institute Hospital, New York, on April 17th. Dr. Abramson had not been in good health since last fall and on February 1st was granted three months' leave of absence. After a few weeks spent in hospital in New York Dr. Abramson spent a month in Florida, returning to New York about a fortnight before his death.

Dr. Abramson, whose home was in St. Joseph, Missouri, graduated in medicine from Yale University in 1911. After interneships served in the Rhode Island Hospital, Providence, and the New Haven Hospital, he became associated with Dr. Wm. H. Park in the Research Laboratories of the City of New York and while there engaged particularly in research work in connection with poliomyelitis.

When the New Brunswick Department of Health was formed under the Honourable Dr. W. F. Roberts in 1918 Dr. Abramson was appointed Director of Laboratories, as well as Provincial Pathologist and Bacteriologist. From a very small beginning in quarters in the old General Public Hospital Dr. Abramson has, in the intervening years, built up the Department of Laboratories to the present highly organized and efficient service which occupies a wing in the present General Hospital at Saint John. For a number of years Dr. Abramson was also consulting pathologist to the Provincial Hospital for Nervous Diseases.

Dr. Abramson's scientific attainments were of a very high order and coupled with his unbounded energy and a particularly pleasing personality he succeeded in building up a department which was a credit to the Province.

In addition to his professional duties Dr. Abramson took a very keen interest in the Kiwanis Club, being one of the founders and a most active member of the Saint John Club. Several years ago he was largely instrumental in the organization of the Family Welfare Bureau and acted as president until a few months before his illness.

For many years Dr. Abramson was an active member of both the Canadian Public Health Association and the American Public Health Association.

In the death of Dr. Abramson New Brunswick has suffered a great loss for he was not only a great asset to the medical profession but also a splendid type of citizen.

BOOKS AND REPORTS

Sterilization? Birth Control? *By Helen MacMurchy, C.B.E., M.D. Published by The MacMillan Company of Canada, Limited, St. Martin's House, 70 Bond Street, Toronto,* 1934. *Price,* $1.50.

This excellent work has come off the press at a very opportune moment. For the last few years the mind of the thinking public has been concerned with the burden of expense the country has had to carry in order to support the ever increasing number of its mental defectives, and has been trying to find a solution.

Many good citizens, doctors, eugenists and social workers have felt that ultimate solution of the problem lies

in sterilization and birth control, many others are opposed to such a solution, but the great majority of the people are ignorant concerning these matters and wish to be informed.

For these Dr. MacMurchy's book will be both illuminating and instructive. With great clarity and simplicity she explains the situation in Canada as it is to-day, and traces the history of sterilization as it was in the beginning and as it has grown in America and Europe during the last half century. She has also included authoritative reports of the recommendations of many outstanding welfare and eugenic societies on the subject, together with such special acts of legislature as are now in force in different states and provinces.

The second section of her book is devoted to a consideration of the question of birth control. It contains a wealth of sound common sense and a great deal of worthwhile information, not the least valuable of which is the relation of the law to contraception.

It is not a book for the irresponsible, but is one which every thinking man and woman who is interested in the present and future welfare of the community would be well advised to read. W.B.H.

The Modern Treatment of Syphilis. *By Joseph Earle Moore, M.D., The Johns Hopkins University and The Johns Hopkins Hospital, Baltimore. Published by Charles C. Thomas, 220 East Monroe Street, Springfield, Illinois,* 1933. 535 *pages. Price,* $5.00 *postpaid.*

This modern work consists of 32 chapters, each of which contains important knowledge as to the diagnosis, prognosis and treatment of syphilis. The work is extremely well illustrated and very readable. Many points which in the past have been either misunderstood or not understood by general practitioners are thoroughly explained in the chapters dealing with "Reactions and Drugs".

The author divides his work as follows: The Biology of the Infection, The Prognosis of Syphilis, and The Therapeutic Problem and the Patient. Chapters are devoted to the Arsphenamines, Bismuth, Mercury and the Iodides. A whole chapter is devoted to the explanation of the reactions produced by the arsenical drugs in the treatment of syphilis. This chapter alone is sufficient reason for the production of the work.

The author then goes on to deal with the specific treatment of the disease according to the stage. The treatment of early syphilis and the complications of the disease in this stage are thoroughly dealt with. Further chapters deal with latent, cardiovascular and tertiary syphilis.

A portion of the book is devoted to an excellent description of the incidence, prophylaxis and the prognosis of neuro-syphilis; following this is a suggested outline of the therapeusis of this type of syphilis. The use of malaria, diathermy, hot baths, short wave radio and tryparsamide are all dealt with in detail.

The author concludes his work with a chapter on the treatment of congenital syphilis and the Wassermann fast patient. An excellent bibliography is to be found at the end of each chapter. For those who are treating this disease this book is a very excellent reference and to those who wish merely information regarding the disease one can highly recommend the perusal of it. C.P.F.

Food, Nutrition and Health. *By E. V. McCollum, Ph.D., Sc.D., and J. Ernestine Becker, M.A., School of Hygiene, The Johns Hopkins University, Baltimore. Published by the authors; address, East End Post Station, Baltimore, Md.* 146 *pages. Price,* $1.50 *postpaid.*

The present volume is a rewritten third edition of a book which is more than just another popular volume on nutrition. The commanding position in the field of nutrition occupied by the senior author invites the respect which the book deserves. It is small, well-printed and easy to read, yet it furnishes a great deal of valuable in-

formation. This book may be recommended to lay readers and also to clinicians as an interesting outline of current views in nutrition.

After three introductory chapters dealing with the general aspects of nutrition, and with the value of carbohydrates and proteins, the volume contains six chapters each summarizing information regarding one of the recognized vitamins. Chapter ten deals with mineral elements. Two chapters having to do with dietary habits are of interest but the reviewer is unable to agree with the statement on page 54 that: "The safest guide to satisfactory nutrition as to other matters relating to human welfare is experience". The authors give several demonstrations in refutation of this dictum. For example, they point out that in Western countries the consumption of green vegetables has never reached the stage which is desirable.

There are several chapters of considerable practical value. Particularly commendable is the one entitled, "A System of Diet which Promotes Health". This chapter, coupled with the menu suggestions, enables a reader to make use of the principles set forth in the early part of the book.

E. W. McH.

Annual Report of the Department of Public Health, City of St. Catharines, Ontario, for the Year Ending October 31, 1933. 18 *pages.*

Presented for the first time in printed form, 18 pages and cover, this report is an achievement in itself. Without copying the customs of the past, many of which are outworn, Dr. D. V. Currey, Medical Officer of Health, has presented in a most attractive, readable form a review of the work and the accomplishments of his department. It is written so that it will be read with interest and be understood by the public, but it is nevertheless complete and satisfies the requirements of the trained public health worker. He "balances his accounts" and summarizes the work in the following pithy sentences with which he opens the report.

"The question is often asked if the amount of money spent on health pays in dividends; in this regard I would draw to your attention the following:

"1. The general death rate for St. Catharines this year is 8.2, the lowest ever recorded.

"2. The infant mortality rate is 49.2, which is much lower than that of the average city of its size.

"3. Only three deaths occurred from tuberculosis.

"4. There has not been a death from diphtheria in this city for over five and one-half years.

"5. The cost of the Department of Health this year has been $10,831, or a per capita cost of 41c. This shows that we have combined economy with efficiency."

It is to be noted that he does not give the almost entirely useless information that so many died from heart disease—but he shows how sickness and deaths have been actually prevented and how the work of prevention must be extended. And in the sub-reports of his assistants the idea of prevention, how it is attained and what it accomplishes, is stressed. There is no suggestion that all that might have been hoped for has been attained. There is still more work to be done, but, in Dr. Currey's words, "The results should inspire us to do more efficient work because of the lives we are saving."

The report has certain details of definitely local interest (and even the stranger does not find them boring) which are of prime importance in bringing the Department of Public Health in close contact with the public. This reviewer feels that the citizens of St. Catharines will find this report for 1933 most interesting reading and that they will, after reading it, be staunch friends of the department and proud of its achievements. The printing is clearly done and the few illustrations add to the general good impression. N.E.McK.

CURRENT HEALTH LITERATURE

These brief abstracts are intended to direct attention to some articles in various journals which have been published during the preceding month. The Secretary of the Editorial Board is pleased to mail any of the journals referred to so that the abstracted article may be read in its entirety. No charge is made for this service. Prompt return (after three days) is requested in order that the journals may be available to other readers.

The Differential Diagnosis in Acute Poliomyelitis

Of 1,123 patients admitted to a hospital in New York in 1931 with a diagnosis of poliomyelitis, 113 were found not to have poliomyelitis but to be suffering from other conditions. These 113 cases form the basis of this report and the authors hold that the majority of these should have been correctly diagnosed by the family physician. Brief outlines of the more instructive cases are given.

M. Bernard Brahdy and Maurice Lenarsky, J.A.M.A., *102*: 1358 (April 28), 1934.

Acute Poliomyelitis-Therapy by Blood Transfusions

During the 1931 epidemic of poliomyelitis in Brooklyn, 71 patients were treated with transfusions from immune donors. Of these, 35 were in the preparalytic stage and in this group subsequent paralysis occurred in 8.8 per cent, while the mortality was 2.8 per cent. The others, transfused after the onset of paralysis, showed a mortality of 11 per cent. The transfusion, in the preparalytic group, was followed by a critical change in the patients' condition; in 32 cases the temperature became afebrile in 24 hours.

Fifty-five patients (32 preparalytic cases) were treated with convalescent serum. In this preparalytic group the mortality was 10 per cent and in the paralytic group 20 per cent. There was subsequent paralysis in 50 per cent of the preparalytic cases.

The author points out that the series is too small to justify sweeping conclusions, but considers his results sufficiently encouraging to justify a fair trial of treatment by transfusion in the future.

Irving Sherman, Am. J. Dis. Child., *47*: 533 (March), 1934.

The Etiology of Undulant Fever in Canada: *Brucella Abortus* Isolated from Two Cases in Quebec

Two cases of undulant fever are described. From the blood of both cases *Br. abortus* was isolated.

Redvers Thompson, Canad. M.A.J., *30*: 485 (May), 1934.

Cough Plate Examinations for B. Pertussis

In the authors' experience a cough plate diagnostic service for pertussis has proved a practical procedure. The medium and methods are described. It was found possible to make 23 per cent of the positive diagnoses in 48 hours and 75 per cent in 72 hours. The Health Department has been making use of the laboratory findings in the hope of more effective isolation of cases in the early most infective stage. B. pertussis is rarely isolated after the fourth week and patients harbouring it after this time are tentatively regarded as convalescent carriers. All of 136 cultures were found to fall into the same serological group.

Pearl Kendrick and Grace Eldering, Am. J. Pub. Health, *24*: 309 (April), 1934.

Vectors of Relapsing Fever in Relation to an Outbreak of the Disease in British Columbia

An outbreak of relapsing fever which occurred in British Columbia is discussed from the point of view of arthropod vectors. It is suggested that the vector may have been introduced from Mexico or the south-western United States.

Eric Hearle, Canad. M.A.J., *30*: 494 (May), 1934.

Control of Swimming Pools

The first of two articles describing the essentials in the control of outdoor and indoor pools. In this article chemical control is presented.

Carl A. Hechmer, Municipal Sanitation, *5*: 120 (April), 1934.

Methods for the Microbiological Analysis of Butter

Cultural methods of analysis are discussed in this paper, but it is stated that microscopic methods have many advantages.

E. H. Parfitt, Am. J. Pub. Health, *24*: 303 (April), 1934.

Iodized Salt a Factor in Iododerma

Seven cases of severe inveterate acne from the ingestion of iodized salt alone and two cases of severe iododerma are recorded. The author does not condemn the use of iodized salt but calls attention to its dangers as either a direct cause or at least a sensitizing agent in the occasional development of severe iododermas.

Paul E. Becket, Arch. Dermat. & Syph., *29*: 529 (April), 1934.

The Treatment of Trade Wastes

An outline of steps taken in dealing with pulp and paper mill wastes, milk plant wastes, and cannery wastes.

L. F. Warrick, Am. J. Pub. Health, *24*: 372 (April), 1934.